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Working Paper n. 2016-07

JUNE 2016

**u n i m i** UNIVERSITÀ DEGLI STUDI DI MILANO



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# A professional premium for LHC students: perceptions from within

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This version: 07-06-2016

## Abstract

More than 36,000 students and post-docs will be involved in experiments at the Large Hadron Collider (LHC) until 2025. Do they expect that their learning experience will have an impact on their professional future? By drawing from earlier salary expectations literature, this paper proposes a framework aiming at explaining the professional expectations of early career researchers (ECR) at the LHC. The model is tested by data from a survey involving 318 current and former students (now employed in different jobs) at LHC. Results from different ordered logistic models suggest that experiential learning at LHC positively correlates with both current and former students' salary expectations. At least two not mutually exclusive explanations underlie such a relationship. First, the training at LHC gives early career researchers valuable expertise, which in turn affects salary expectations; secondly, respondents recognise that the LHC research experience *per se* may act as signal in the labour market. Respondents put a price tag on their experience at LHC, a 'salary premium' ranging from 5% to 11% in terms of their future salaries compared with what they would have expected without such experience.

**Keywords:** Research infrastructures, Cost-Benefit Analysis, Human Capital, Expectations, Salary Premium, Large Hadron Collider

**JEL Codes:** C83, D31, D61, D81, I23, O32

**Acknowledgments:** This paper has been produced in the frame of the research project '*Cost/Benefit Analysis in the Research, Development and Innovation Sector*' sponsored by the EIB University Research Sponsorship programme (EIBURS), whose financial support is gratefully acknowledged. Further details on this research project can be found at: <http://www.eiburs.unimi.it/>

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## 1 Introduction

Early career researchers (hereafter, ECR) in physics are often involved in international collaborations (Choi et al., 2011). This is an effective way for ERC to gain practical knowledge and enhance their employment opportunities (Islam et al., 2015). Employability may be further improved when such an experience takes place in a highly renowned laboratory, such as the European Organisation for Nuclear Research (CERN) (Schopper, 2009). By analysing the career of physics students involved at the Delphi experiment at CERN's LEP electron-positron collider from 1982 to 1999, Camporesi (2001), suggests that the interest of the private sector in students and researchers who spent a period at CERN "cannot be in the knowledge of fundamental law of nature, but rather on the skills that our students acquire. [...] Whatever they do go on to do, their stay at CERN certainly plays a major role" (p. 146). In the same vein, OECD (2014) emphasises that "the intellectual environment at high-energy physics (HEP) laboratories is exceptional, and is probably comparable to that of the most innovative high-technology companies" (p. 18). ECR in such an environment improve their skills by working on experiments, interacting with different cultures, writing their PhD thesis, participating to meetings, conference and workshops. These competencies can be exploited in many workplaces, even outside HEP (OECD, 2014; Boisot, 2011; Camporesi, 2001). Yet, through a survey targeted to the US High-Energy Physics community, Anderson et al. (2013) confirm that many of the skills learned in the high-energy laboratories are valued much both on academic and non-academic career path (see also Danielsson, 2013; Laurila, 2013)<sup>1</sup>.

More in general, according to earlier literature on salary expectations, graduates have own expectations about their professional lives based on their information set (Shelley, 1994). High-energy physics changes the information set of students by providing them technical and problem-solving capacity as well as team-work capabilities, management and communications skills. The latter have been often found poor in science graduates without such advanced experimental training (Nielsen, 2014; IOP- Institute of Physics, 2012; Sharma et al., 2008; O' Byrne et al., 2008; Rodrigues et al., 2007).

This body of research suggests that ECR salary expectations are influenced by experiential learning in international collaborations, mainly based on high-value skills acquired during such involvement. However, there is no a coherent and comprehensive explanation on why and how this relationship between research experience and rewards expectations arises. Focussing on the LHC, this paper attempts to fill this gap by answering three research questions: Does the experiential learning at LHC affect salary expectations of ECR, once controlling for their personal characteristics and other potential confounding factors? If yes, which of the acquired skills mediate the relationship between this *sui generis* experience and salary expectations? And, to what extent? How much a potential "LHC premium" is worth in terms of expected salaries?

In order to answer these questions, we analyse detailed data on 318 students and former students at LHC by using ordered logistic models. Data were collected by means of a questionnaire-

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<sup>1</sup> Danielsson H. (2013). Students as a Bridge Building Link. CERN Presentation at NORDTEC-Conference in Lund, June.

[https://www.lth.se/fileadmin/lth/images/Nyhetsbilder/NORDTEK\\_Hans\\_Danielsson.pdf](https://www.lth.se/fileadmin/lth/images/Nyhetsbilder/NORDTEK_Hans_Danielsson.pdf)

Laurila, S. (2013). Students as a Bridge Building Link. Student Perspective on the Cooperation of Universities and Large Scale Research Facilities. Presentation at at NORDTEC-Conference in Lund, June. [https://www.lth.se/fileadmin/lth/images/Nyhetsbilder/NORDTEK\\_Santeri\\_Laurila.pdf](https://www.lth.se/fileadmin/lth/images/Nyhetsbilder/NORDTEK_Santeri_Laurila.pdf)

based survey carried out between October 2014 and March 2015 through both on-line questionnaires and face-to-face interviews at CERN.

The remainder of this paper is structured as follows. Section 2 describes the research methodology. Specifically, this section introduces a framework to interpret the link between a period as student or post-doc at the LHC and salary expectations. The model was drawn from the literature on salary expectations and tailored to the specific needs of this study. Section 3 presents the results. Here, the framework is tested considering end-career salary expectations. Section 4 concludes.

## 2 Context and research methodology

CERN is currently the most important particle physics laboratory in the world. It offers - mainly through the Academic institutes associated to the Experiments operating on the accelerator complex - the opportunity to spend a training period at its high-energy physics experiments mostly through two programmes addressed respectively to Bachelor and Master students and PhD students in physics, engineering and computing. Typically the undergraduate programs give the possibility to spend at CERN from 4 to a maximum of 14 months; while in the doctoral programs this period ranges from 6 to 36 months. The number of incoming students at LHC experiments was about 9,000 from 2009 (the first LHC operating year) to 2014 (CERN Personnel Statistics yearly reports). Florio et al. (2016) estimate that this number increases to 36,800 (17,400 students and 19,400 post-docs) if the 1993-2025 time span is considered.<sup>2</sup> It is the period that goes from the first year of construction of the LHC the end of the first phase of operation, in 2025.

Having in mind our research questions, a structured questionnaire (see Annex 1) was drawn up as a result of extensive review of earlier literature on the topic and advice from experts as well as of CERN personnel. The survey was addressed to both current and former students at LHC. Current students are respondents who were involved in different experiments at the LHC at the time the survey was conducted. Hereafter, we refer to them simply as students. Students are mainly Bachelor, Master holders or on-going PhD students. In contrast, former students are those individuals who, after having been students at the LHC, at the time of the survey, either worked at CERN as Users, Fellows or Associates<sup>3</sup> or they had already left CERN and were employed in different sectors. Hereafter, we refer to them as employees.

The questionnaire was structured along four sections. The first two sections inquired about personal information and experience at LHC. They were targeted to both students and employees. Section three focused on students and it investigated on expectations about their professional career including gross starting and end-career salary expectations. The fourth section was directed to

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<sup>2</sup> The taxonomy adopted by CERN classifies students into the following categories: doctoral students (mostly from institutes participating to CERN based Experiments or directly supported by CERN for specific Applied Physics programs), CERN technical students, CERN fellows and Users. See CERN Personnel Statistics yearly reports for details. The figures reported here only refer to the apportionment of these personnel categories to the LHC; that is LHC students (doctoral and technical), LHC fellows and LHC users. Users and Fellows aged more than 35 as well as participants to summer schools or short courses are not included (see Florio et al., 2016 for details).

<sup>3</sup> Users are CERN's guest scientists, technicians and engineers sent to CERN as members of a visiting research team to contribute to the upgrade or analysis of experiments under a memorandum of understanding with their home institution. Fellows (Fb) are graduates of a higher educational establishment, typically with a maximum of ten years' relevant professional experience. They are appointed by the CERN for a limited period of time to perform functions within the CERN as part of their professional development. Cooperation Associates (COAS and MPAC) are scientists technicians and engineers admitted by CERN to contribute on behalf of their home institution to the execution of a collaboration under an agreement between the CERN and their home institutions (see CERN Personnel Statistics yearly reports for details, or visit <http://www.useroffice.web.cern.ch>)

employees and inquired about both the current professional career and future expectations. Clearly, the starting salary of employees refers to their first or current professional experience and thus, it is an *observed* salary and not an *expectation* (see questions D.10 and D.14 of the questionnaire).

Except for salary expectations, questions related to future outlooks utilise multiple-item constructs, measured with two different types of scale: ordinal and nominal. Ordinal scales employ five-point Likert scales, with anchors of 1 and 5, indicating the weighting assigned by individuals to a set of not mutually exclusive statements about their working experience at LHC (as examples see questions B.6 and B.7 of the questionnaire). Nominal-type scales differentiate between multiple items based on qualitative classifications such names or meta-categories. Nominal variables were coded as binary (1/0) variables. An example would be the question C.3 of the questionnaire.

Two techniques were used for statistical pre-treatment of data. The first one was factor analysis of principal components (hereafter, PCA) with Varimax rotation, applied to those variables measured by ordinal Likert scales. The suitability of the data for PCA was tested for each variable by using the KMO Measure of Sampling Adequacy with the threshold value of 0.5 (Cheung et al., 2000; Cheung and Yeung, 1998; Holt, 1997). The second technique was factor analysis of multiple correspondence (hereafter, MCA) used on nominal variables<sup>4</sup>. The two factor analyses were performed to homogenise the information, and obtain new, continuous variables (factor scores) to constitute the inputs for later multivariate analysis, without loss of relevant statistical information. Furthermore, the factors are linearly independent, so any possible presence of collinearity in the original data was eliminated, revealing their underlying structure.

The number of factors retained for canonical ordered logistic analysis was selected according to the criteria listed below. For PCA, the number of factors to include in later multivariate analyses was determined according to eigenvalues and cumulative percentage of variance criteria. Kaiser's (1961) rule of thumb suggests the retention of those factors with an eigenvalue greater than unity. In addition, Hair et al. (1998) suggest that in social science, factors may be stopped at least when 60 per cent of the cumulative variance was explained. In order to interpret the principal component solution, the principal component loadings were detected.

As for the MCA, it is well known that, because of the coding scheme used by the MCA to process data, the inertia (i.e. variance) of the solution space is severely underestimated (Benzécri, 1979). A better estimation of the inertia, based on pseudo-eigenvalues, was proposed by Greenacre (1993). He suggested evaluating the percentage of inertia relative to the average inertia of the off-diagonal blocks of the Burt's matrix. Thus, we made use of the Greenacre's (1993) formula to select the relevant factors (Abdi and Valentin, 2007). The interpretation of factors (i.e. dimensions) was based on their graphical projections (Greenacre 2000; Blasius and Greenacre, 1998).

We tested the influence of LHC experiential learning on end-career salary expectations by using ordered logistic regressions. One may argue that pre-career or early-stage career perceptions may not have important implications for real future career development. Actually, Van Maanen and Schein (1977) define careers as a sequence of experiences and transitions. As a result, expectations individuals form before entering in the labour market or in the entry level, do influence their making decision process about the next step during their whole professional life. This theory has

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<sup>4</sup> The statistical package used for this was Stata, version 13.0.

been empirically validated by demonstrating that perceptions at pre-career level strongly affect subsequent salary increases (Fernandez-Mateo, 2009; Keaveny and Inderrieden, 2000). Moreover, European Commission (2014, Chapter 7) suggests that the benefit of human capital development should be measured on the lifelong salary. End-career salary expectations are, thus, used as dependent variables in our analysis.

Drawing on contemporary research on salary expectations (Frick and Maihaus, 2016; Schweitzer et al., 2014; Maihaus, 2014) and on science (mainly, physics) graduates marketability (Islam et al., 2015; Nielsen, 2014; IOP- Institute of Physics, 2012; Jusoh et al. 2011; Hazari et al, 2010; Sharma et al., 2008), we identified the following three sets of independent variables.

Set 1. The *personal characteristics* includes:

- *Male*. It is a dummy variable taking on the value 1 for males and 0 for females;
- *Age* is a continuous variable measured in years;
- *PhD* is a dummy variable taking on the value 1 if the highest education qualification is at least a PhD or the PhD is on-going; and 0 for master and bachelor degrees;
- *Nationality* is a dummy variable which takes on value 1 if the respondent comes from a CERN Member State and 0 otherwise<sup>5</sup>;
- *Physics* is a dummy variable, which takes on value 1 if the academic background is physics and 0 otherwise (e.g. engineering or computer science);
- *Employee* is a dummy variable, which takes on value 1 if the respondent is an employee and 0 if he is a student.

Set 2. The *experience at LHC*. We proxied the experience at LHC with the variables listed below.

The main candidates are the type of skills acquired during that training period. Specifically, respondents were asked to what extent the following skills have improved thanks to the experiential learning at LHC (see for details, question B.7)

- *Technical skills*. It is a continuous variable (factor score) which is linked to skills such problem-solving capacity, scientific and technical skills, independent thinking, critical analysis and creativity;
- *Communication skills and leadership*. It a continuous variable (factor score) and it is related to skills such communication, team/project leadership, developing, maintaining and using networks of collaborations.

The length of the research period spent at LHC and the type of experiments respondents have worked on are also entitled proxies of the experiential learning at LHC. As a result, we propose:

- *Length of stay*. It indicates the length of the research period individuals have spent at LHC. It is a continuous variable measured in months (questions B.1 and B.2).

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<sup>5</sup> CERN Member States are Austria, Belgium, Bulgaria, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Italy, Netherlands, Norway, Poland, Portugal, Slovak Republic, Spain, Sweden, Switzerland, United Kingdom, and Israel.

- *ALICE, ATLAS, CMS, LHCb*. They identify the four experiments of the LHC. Each of the experiments is codified as a dummy variable taking on the value of 1 if the respondent has worked on that experiments and 0 otherwise.

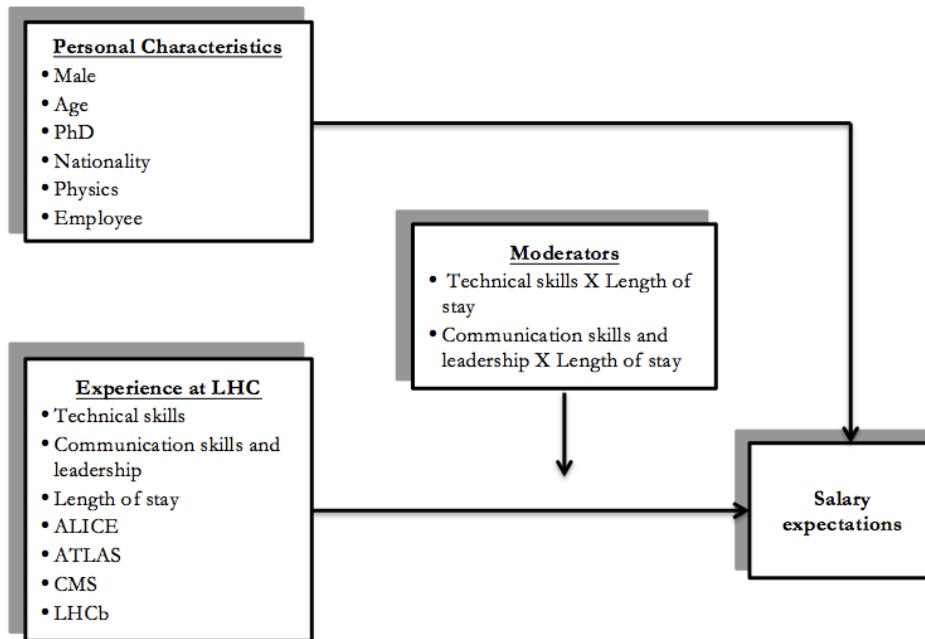
Finally, it can be argued that the longer is the stay at LHC, the more likely that ECR develop valuable skills, which in turn increase pay expectations. Using this logic, we introduce the following:

Set 3. The *moderators* includes:

- *Technical skills X Length of stay*. It is an interaction term between the length of the research period individuals have spent at LHC and technical skills. It is a continuous variable.
- *Communication skills and leadership X Length of stay*. It is an interaction term between the length of the research period individuals have spent at LHC and communication skills.

Summing up, we introduce a comprehensive model to test the relationships between the experience at LHC - proxied by the skills acquired and/or length of stay- (Florio et al., 2016; OECD, 2014; Boisot, 2011; Camporesi, 2001) and salary expectations, by controlling for personal characteristics (Set 1), and the type of experiments, which individuals have worked on (i.e. ALICE, ATLAS, CMS, LHCb). Furthermore, we test the hypothesis according to which the predictive effect of the skill acquired at LHC and the length of stay may interact each other (Set 3) meaning that the longer is the stay at LHC, the more likely that ECR develop valuable skills, which in turn increase pay expectations. Our final point is to identify the value that ECR attach to such a working experience. To this end, we look at the marginal effects of the experiential learning spent at LHC on salary expectations. The model, including the research questions, is shown in Figure 1.

**Figure 1** Analytical Framework



### 3 Data and Results

The study moves from data collected through a survey to current and former students working on LHC experiments coming from 52 countries (see Figure, A.1, Annex I). The survey was carried out between October 2014 and March 2015 and resulted in 384 questionnaire collected, of which 221 through face-to-face interviews at CERN and 163 filled in online.<sup>6</sup> The sample used for our analysis includes 318 valid questionnaires (195 collected face-to-face and 123 online).

Table 1 reports the descriptive statistics of personal characteristics of respondents and the length of period they have spent at LHC. Males represent 73% of the sample (71% amongst students and 75% amongst employees). 71% of respondents have at least a PhD as their highest education level; the remainder are bachelor or master degree holders. Amongst the employees, the percentage of those with a PhD is 90%. Actually, they are mostly post-docs.

**Table 1** Personal characteristics and length of period at LHC.

Variable	Total (n=318)	Students (n=141)	Employees (n=177)
<b>Discrete Variables</b>			
Gender (%)			
Male	73.3	70.9	75.1
Female	26.7	29.1	24.9
Education (%)			
At least PhD	71.4	48.2	89.9
Less than PhD	28.6	51.8	10.1
Nationality (%)			
Member State	62.3	61.7	63.3

<sup>6</sup> The details of the survey are available in Catalano et al. (2015).



Non-Member State	37.4	38.3	36.7
Academic background (%)			
Physics	85.5	80.1	89.3
Other	14.5	19.1	10.7
<hr/>			
<b>Continuous Variables</b>			
Age (years)			
Mean	31.1	28.2	33.4
Std. Dev.	4.7	3.5	4.0
Min	21	21	25
Max	44	38	44
Length of stay at LHC (months)			
Mean	44.7	24.4	59.3
Std. Dev.	34.7	17.4	36.6
Min	1	1	1
Max	181	72	181

With regard to the academic background, 85% are physicists, while the remaining 15% have a degree in engineering or computer sciences (a more detailed breakdown is shown in Figure A.2, Annex 1). About 63% of the sample is from a CERN Member State. The average age of respondents is 31 years with an average of 45 months working experience at LHC. Among students (average age equal to 28 years) the average training period is 24 months, while among employees (average age equal to 33 years), the average length of stay at LHC is about 60 months. The excessive length of stay recorded among employees with respect to students, indicates that in our sample there is a fairly large share of employees currently working at CERN as Users, Fellows or Associates (Figure A.3, Annex 1). Finally, the distribution of respondents among the different experiments is as follows: 5% at ALICE, 25% at ATLAS, 62% at CMS and 8% at LHCb (Figure A.4, Annex I). Note that in our sample, ECR working on CMS are over-represented because the survey was first launched to CMS current and former students in collaboration with the CMS team<sup>7</sup>. Afterwards, the survey was extended to other experiments as well.

Figure 2 and Figure 3 report, respectively, descriptive statistics of the variable related to skills acquired at LHC (question B.7) and the kind of activity on which respondents have spent most of time during such an experience (question B.5).

**Figure 2** Skills improved thanks to the LHC experience

**Figure 3** Distribution of time spent across activities

<sup>7</sup> The support in gathering data and contacts of CMS current and former students is gratefully acknowledge to Tiziano Camporesi (CMS international coordinator) and Nicoletta Barzaghini (CMS Secretariat).

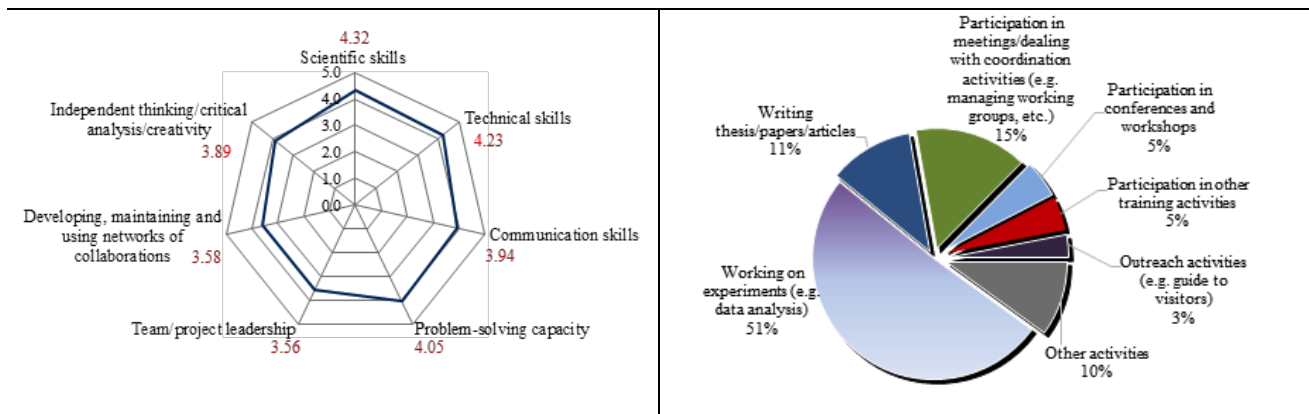


Figure 2 displays that, according to respondents, the LHC experience has improved their technical skills more than communication and leadership skills; while Figure 3 shows that most of the time respondents have spent at LHC, was dedicated to working on experiments, and specifically, data analysis (51%) and writing papers and/or thesis (11%).

The distribution of starting and end-career gross salary expectations split by employment status is reported in Table 2.

**Table 2** Gross salary expectations distributions. Percentage.

Category	Starting-career salary		End-career salary	
	Students (%)	Employees (%)	Students (n)	Employees (%)
< 30,000 EUR	22.7	13.1	4.3	2.3
30,000-40,000 EUR	24.1	23.2	5.1	1.7
40,000-50,000 EUR	24.1	14.9	3.6	5.2
50,000-60,000 EUR	10.1	16.7	19.6	11.6
> 60,000 EUR	19.1	32.1	67.4	79.2

**Note:** Employment status differences in the expected salaries were assessed using a Pearson's chi-square test for starting-career salary distribution and a Fisher's exact test for end-career salary distribution. Both tests reject the null of the similarity of distributions.

It shows that responses about initial career expected salaries tend to group in the lowest salaries categories (less than EUR 50,000). This particularly holds among students. For employees, the distribution of initial career salary is quite heterogeneous among categories. In contrast, the distribution of peak-career salary expectations is concentrated in the highest categories (more than EUR 50,000) for both students and employees. In order to test whether students and employees differ in their expected salaries, we carried out a Pearson's chi-square test in the initial salary case and a Fisher's exact test in the case of end career salaries expectations<sup>8</sup>. The chi-square test ( $p < 0.01$ ) and the Fisher's exact test ( $p < 0.05$ ) suggest that there is a statistically significant difference between students and employees in expected salaries. We control for such dissimilarity in the following multivariate analysis by including an employment status dummy variable.

<sup>8</sup> The use of two different tests is necessary because the chi-square test assumes that the value of each cell is five or higher. While this assumption is met in the distribution of starting salary expectations, it does not hold for expected salary at peak of careers. Indeed, many tapes in the lowest categories are less than five.

We answer our research questions using ordered logistic models (Long and Freese, 2014) Results as shown in Table 3. The dependent variable is end-career salary expectations. For each of the regression proposed, the proportional odds assumption, underlying ordered logistic procedure, was tested (Long and Freese, 2014, Chapter 7)<sup>9</sup>. The p-values are reported in the last row of the table.

We carried out the analysis in five steps. In the first step (Column 1) we include only the types of skills respondents declared having improved thanks the training at LHC, which is one of our proxy of the experiential learning. Actually, in the regressions, we only included the variable (factor score) *Technical skills*; the variable *Communication skills and leadership* was never found statistically significant. In the second step (Column 2), we test the length of the research period as proxy of training at LHC; in doing so, we exclude *Technical skills* and include *Length of stay*. One may argue that skills acquired at high-energy physics experiments increase or improve as the length of the research period increases. We test this hypothesis in the third step (Column 3) by adding the so-called *moderators*. The fourth step (Column 4) presents the whole model, which controls for personal characteristics of respondents. We also tried to include in the analysis, others interaction terms to allow more hypotheses to be tested. We failed to find any statistical evidence on the contribution of such interaction terms on salary expectations. Thus, they are not reported in Table 3<sup>10</sup>.

Regardless the step, we always control for four types of specific-effects: first, the employment status (employee versus student). It enables us to capture unobserved heterogeneity that may shape salary expectations of such individuals beyond the experience at LHC. Second, nationality-fixed effects. To the extent that individuals form their salary expectations according to some features of the country of origin, for example labour market conditions or the prevailing type of educational system (Economist, 2016; Maihaus, 2014; Jusoh et al., 2011; Wickramasinghe and Perera, 2010; Hazari et al., 2010), this dummy should capture such an effect. Third, experiments-specific effects. These dummies identify the experiments at which respondents have spent their training period at LHC: ALICE, ATLAS, CMS and LHCb<sup>11</sup>. Last but not least, interview-specific effect.<sup>12</sup> It allows us to reduce any systematic difference between responses obtained by hand and through online questionnaire (Duffy et al., 2005).

Column 1 and Column 2 reveal that experience at LHC positively and significantly correlates with salary expectations both when it is proxied by the acquired competences and by *Length of stay*. Coefficients are respectively 0.103 and 0.009 significant at 10% level. These variables keep their statistical significance up also when they are plugged simultaneously into the

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<sup>9</sup> One of the assumptions underlying ordered logistic regression is that the relationship between each pair of outcome groups is the same. Put differently, the proportional odds assumption requires that the coefficients describing the relationship between, let's say, the lowest versus all higher categories of the response variable are the same as those that describe the relationship between the next lowest category and all higher categories, etc. Because the relationship between all pairs of groups is the same, there is only one set of coefficients (only one model); otherwise, a generalized ordered logistic model should be run. In order to test the proportional odds assumption, we run the Brant test, rather than the "omodel" command, since the latter does not recognize categorical variables. The null hypothesis is that there is no difference in the coefficients between models. In our case, the proportional odds assumption is met in all of proposed regressions, except for the first model (Column 1, Table 3). For further details see Long and Freese (2014) or visit <http://www.ats.ucla.edu/stat/stata/dae/ologit.htm>.

<sup>10</sup> In an unreported regression, interaction terms between personal characteristics and our proxies of experience at LHC (*Technical skills* and *Length of stay*) were tested as suggested by Hogue et al. (2010). We found no statistical significance. However, results are available upon request.

<sup>11</sup> Even though these dummy variables could be potentially interesting for the purpose of our analysis, we found them never statistically significant.

<sup>12</sup> This dummy variable takes on the value of 1 if the interview was carried out face-to-face and 0 otherwise.

**Table 3** Ordered logistic estimates. Dependent variable is End Career Salary Expectation.

Variables	(1) coef	se	(2) coef	Se	(3) coef	Se	(4) coef	se	(5) coef	se
<b><i>Experience at LHC</i></b>										
Technical skills	0.103*	(0.062)			0.110*	(0.061)	0.004	(0.145)	0.006	(0.149)
Length of stay			0.009*	(0.005)	0.009*	(0.005)	0.011**	(0.005)	0.016***	(0.006)
Technical skills X Length of stay							0.004**	(0.002)	0.004**	(0.004)
<b><i>Personal Characteristics</i></b>										
Employee	0.814***	(0.282)	0.455	(0.346)	0.493	(0.352)	0.500	(0.354)	0.539	(0.409)
Male									1.112***	(0.310)
Age									0.056	(0.043)
PhD									2.280***	(0.805)
Physics									-0.032	(0.408)
Nationality-specific effects	Yes		Yes		Yes		Yes		Yes	
Experiments-specific effects	Yes		Yes		Yes		Yes		Yes	
Interview-specific effects	Yes		Yes		Yes		Yes		Yes	
Observations	318		318		318		318		318	
McFadden's R2	0.036		0.035		0.043		0.050		0.112	
Log Likelihood	-254.3		-240.8		-237.4		-235.9		-216.8	
Likelihood ratio test	16.87		17.99		19.17		22.75		46.13	
Proportional odds hp test (p-value)	0.291		0.276		0.227		0.205		0.268	

Table shows the determinants of the probability of falling in one of the expected salary category. Robust standard errors in parentheses. \*\*\*, \*\*, \* denote significance at the 1%, 5% 1% level respectively.

same model (Column 3,  $coef = 0.110$  and  $0.009$ , respectively,  $p < 0.10$ ), suggesting that the time spent at LHC generates *per se* increasing salary expectations, aside the skills acquired. Column 4, adds the interaction term between *Technical Skills* and *Length of stay*. The positive and statistically significant coefficient on the interaction term ( $coef = 0.004$ ,  $p < 0.05$ ) indicates that the skills acquired at LHC increase as the time spent on the experiments increases, which in turn generates higher rewards expectations. This is confirmed by the fact that the variable *Technical Skills* loses its predictive power in explaining salary expectations. As before, *Length of stay* retains its own significance ( $coef = 0.016$ ,  $p < 0.01$ ).

The estimated association between salary expectations and experiential learning at LHC remains robust also after adding respondents' personal characteristics (Column, 5). In addition, the coefficient on Male is positive and statistically significant at 1 percent level reflecting a substantial gender gap in salary expectations among graduates (Schweitzer et al., 2014; Hogue et al., 2010; Ng and Wiesner, 2007), and, particularly among physicists (Hazari et al., 2010; IOP- Institute of Physics, 2012; Lissoni et al., 2011). The variable PhD enters positively and significantly as well, confirming that salary expectations increase with educational attainment (Islam et al., 2015; Jusoh et al., 2011; Shelley, 1994). There are no significant differences on end-career salary expectations between employees and students; this result means that once controlling for personal characteristics, the employment status loses its predictive power in explaining expected salaries. This is probably due to the fact that, after all, the community of HEP is relatively small and information circulates amongst ECR of different seniority, at least for not too distant cohorts.

Finally, the likelihood ratio tests in the models indicate that the variation in the independent variables explains a good proportion of the variability in the response variable<sup>13</sup>.

The outcome of the econometric analysis performed so far, leads us to put forward the following interpretation of our findings. Firstly, experiential learning at LHC positively influences both current and former students' salary expectations. Such a relationship remains robust also when personal traits and other potential confounding factors have been netted out. Secondly, both acquired competencies and the length of the research period *per se* have a predicting power in explaining ECR's pay expectations. Specifically, and as expected, the importance of the technical skills in explaining salary expectations rises as the length of the training period at LHC increases.

What is the role that the stay at LHC *per se* plays, irrespective of the skills respondents declared to have acquired? As stated above, economic actors, formulate their own conjectures about professional lives based on their information set. Here, respondents seem to recognise that an international learning experience at LHC as such, acts as signal about their general abilities - apart from formal acquired skills - in the labour market that may allow them to be screened in higher-paid jobs. In the words of Stiglitz (1975, p. 287): "since individuals are able to capture the returns to general information about their skills themselves, they are willing to spend resources to provide this information - indeed this is the only way they can fully capture their 'ability rents'". Similarly, Wiers-Jensen (2008) argued that a foreign education experience generally signals certain specific (unobservable) abilities and characteristics of job seekers to employers. She also asserts that international education's signalling effect is weak if it is less known by the employers. If we

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<sup>13</sup> For the sake of simplicity, we chose to not include the constants of the regressions in Table 3. In the ordered logistic models, the constants (here, we have four constants for each model) are cut-points used to differentiate the adjacent levels of the dependent variable. Apart from some exceptions in Columns 2 and 3, they were found all statistically significant, justifying the use of five categories of the level of salary expectations over combining some categories. Actually, some preliminary elaboration on original data leads us to reduce the salary expectation categories from ten (see questions C.7 and C.10 in the questionnaire) to five.

contextualize this line of research in our sample, then the signalling effect should be strong enough, given the worldwide interest that the activities at LHC attract from the general public.

In order to assess the “LHC premium”, we look at marginal effects of the working experience at LHC (proxied by the *Length of stay*) on end-career salary expectations. If a premium is expected, then it should be measured on end/peak salary expectations (Florio et al., 2016; Schweitzer et al., 2014; European Commission, 2014). Marginal effects are shown in Table 4, Column (A); Column (B) reports the values in percentage terms.

**Table 4** Marginal effects of *Length to stay* on End-career salary expectations

End-career salary categories	(A)		(B)	
	marginal effects	se	marginal effects (%)	se
< 30,000 EUR	-0.00051**	(0.00026)	-0.051**	(0.026)
30,000-40,000 EUR	-0.00041**	(0.00020)	-0.041**	(0.020)
40,000-50,000 EUR	-0.00049***	(0.00022)	-0.049**	(0.022)
50,000-60,000 EUR	0.00115***	(0.00044)	0.115***	(0.044)
> 60,000 EUR	0.00255***	(0.00096)	0.255***	(0.096)

\*\*\*, \*\*, \* denote significance at the 1%, 5% 10% level respectively

As expected, one additional month of training spent at LHC increases the probability of declaring an expected salary falling in the two highest categories (50,000-60,000 EUR and >60,000 EUR) and reduces the probability of expecting a low salary (less than 50,000 EUR). For example, an additional month of experiential learning at LHC lowers the likelihood of declaring an expected salary less than 30,000 EUR by 0.05 percentage points; in contrast, it increases the probability of expecting a salary greater than 60,000 EUR by 0.25 percentage points, *ceteris paribus*.

Let’s now focus on the two highest categories (*coef* = 0.00115 and 0.00255,  $p < 0.01$ ), which contain almost 85% of responses. Note also that, in our sample, the average number of months spent at LHC is 44 for the whole sample, 24 for students and 60 for employees. Thus, for an “average” individual who declared an expected salary between EUR 50,000 and 60,000 the experiential learning at LHC is worth about 5% (3% for a student and 7% for an employee). For those respondents whose expected salary falls in the category “>60,000”, the stay at LHC is worth, on average, about 11% (6% for a student and 15% for an employees).

## 4 Conclusions

This paper contributes to the literature on experiential learning and salary expectations by a statistical analysis of survey data of students from experiments operating at the largest particle accelerator in the world, the Large Hadron Collider. We were particularly interested to understanding to what extent earlier results from Camporesi (2001) on students involved in experiments at LEP, a previous major collider at CERN, are confirmed for more recent cohorts of early career researchers. Moreover, we wanted to focus on the estimation of a perceived salary premium of the experience at the LHC and the drivers of such perceptions.

There are several reasons why this context is of interest for a broader research perspective on professional expectations. The LHC operates at the frontiers of science, and for this reason it

attracts students from a very large number of countries (over 50 in our sample). This fact ensures that possible specific country effects play a minor role. The research community of particle physics can be considered as a relatively small but dense global social network, where information on career opportunities is widely shared within each cohort and across cohorts of early career researchers. Moreover, there is fragmentary but interesting evidence that ERC at CERN will have a professional future in a variety of jobs, beyond academic research, including in industry and finance. Thus, it seems that the LHC context, including its experiments, such as CMS and ATLAS, is an ideal testing ground for the more general question of the experiential learning effect on salary expectations.

There are three main findings of our statistical analysis of survey data. First, there is no statistical difference in end career salary expectations between the two sub-samples of respondents: current students and former students. In fact the latter, who have acquired more direct information, are on average more optimistic in their perceptions of the salary premium, but the difference is not statistically significant after controlling for individual characteristics. This suggests that the research community actually shares the information on professional opportunities and this fact shapes homogeneous expectations. This is also indirect evidence of realism of the expectations, because for former students they are based on actual information.

A second finding is that the core drivers of the expectations are *length of stay* at the LHC and *technical skills* acquired. The perceived professional premium is not a purely reputational effect in the job market associated with the mere fact of having been selected for training at CERN, but it increases proportionally to the time spent in research in that context. Respondents were able to indicate on a five-point scale which were the most important skills acquired, and we find that the salary premium increases proportionally to the perceived importance of technical skills. This result clearly points to the perception of experiential learning as a driver of professional opportunities. Finally, and we regard this as the most important result, the interaction between the two drivers is more statistically significant than each of the components.

Overall, we conclude that, in the perception of insiders, professional opportunities arise from sustained experiential learning. In other words, the LHC environment is seen by respondents at the same time as a scientific discovery machine and as an engine of human capital formation.

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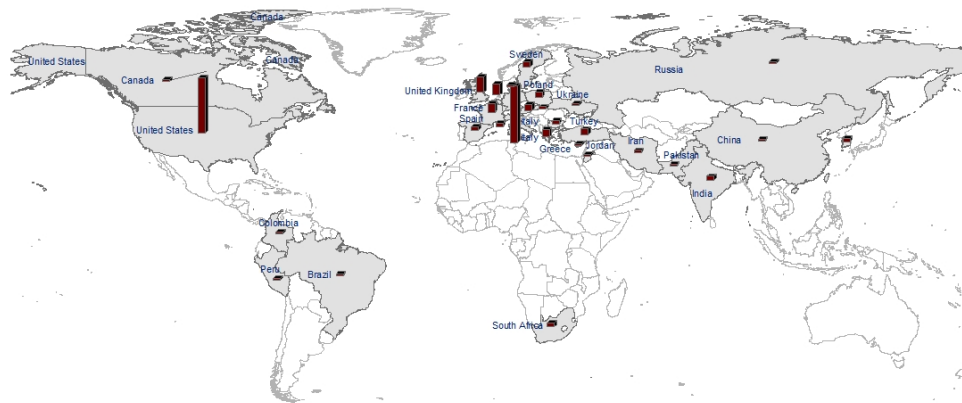
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## Annex I – Additional Statistics and the Questionnaire

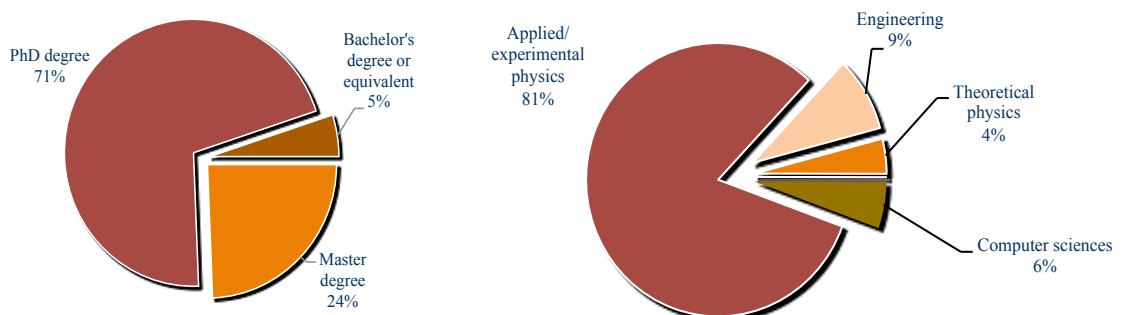
**Figure A.1** Share of respondents by nationality



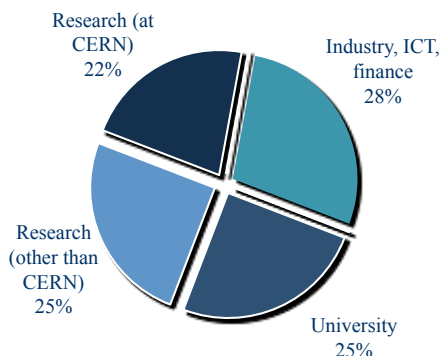
Source: Authors processing

Figure A.1 shows that respondents are mostly European, with an overall representation of 52 nationalities. Respondents from Italy and the USA account for the largest share (38%) followed by the UK and Germany (8%, each).

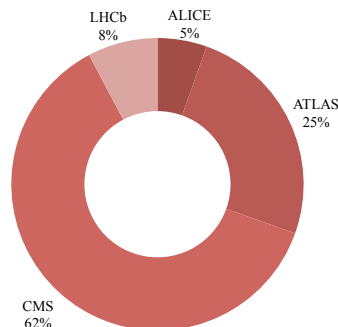
**Figure A.2** Share of respondents by educational degree and academic background



**Figure A.3** Employment sector. Share of employees



**Figure A.4** Distribution of respondents across LHC



PART A – PERSONAL INFORMATION		
<b>A.1</b>	<b>Are you:</b>	<input checked="" type="checkbox"/> Male <input type="checkbox"/> Female
<b>A.2</b>	<b>Year of birth:</b>	
<b>A.3</b>	<b>Your nationality</b>	
<b>A.4</b>	<b>Your highest educational qualification</b>	<input type="checkbox"/> Bachelor's degree or equivalent <input type="checkbox"/> Master degree <input type="checkbox"/> PhD student <input type="checkbox"/> Other, please specify:
<b>A.5</b>	<b>Please, indicate the institution where you have attained your highest educational degree</b>	
<b>A.6</b>	<b>Please, indicate the academic background of your highest educational degree</b>	<input type="checkbox"/> Theoretical physics <input type="checkbox"/> Applied/experimental physics <input type="checkbox"/> Engineering <input type="checkbox"/> Computer sciences <input type="checkbox"/> Mathematics <input type="checkbox"/> Life science <input type="checkbox"/> Other, please specify:
PART B – YOUR EXPERIENCE AT LHC		
In answering questions from B.0 to B.4, please refer to your first experience at LHC. If you have gained further experiences (e.g. working on two different experiments or other experiments not related to LHC, please indicate this information in question B.10 and specify your activity (e.g. fellow, postdoc, etc.)		
<b>B.0</b>	<b>Please, indicate on which of the following activities you have been working when you started your experience at LHC</b>	<input type="checkbox"/> ATLAS experiment <input type="checkbox"/> CMS experiment <input type="checkbox"/> ALICE experiment <input type="checkbox"/> LHCb experiment

		<input type="checkbox"/> LHC machine <input type="checkbox"/> HiLumi LHC <input type="checkbox"/> LIU (Injector Upgrade) <input type="checkbox"/> Other activities related to LHC, please specify																																				
<b>B.1</b>	<b>Start date of your research period at LHC</b>	Month: Year:																																				
<b>B.2</b>	<b>End date of your research period at LHC</b>	Month: Year: <input type="checkbox"/> On-going → <i>Expected to be completed in:</i>																																				
<b>B.3</b>	<b>Please, indicate your educational qualification when you started your research period at LHC</b>	<input type="checkbox"/> Bachelor's degree or equivalent <input type="checkbox"/> Master degree <input type="checkbox"/> PhD student <input type="checkbox"/> Other, please specify																																				
<b>B.4</b>	<b>What is/was your university affiliation during the research period at LHC?</b>																																					
<b>B.5</b>	<p><b>Considering that your time spent at LHC is equal to 100%, please indicate the percentage dedicated to the following activities:</b></p> <p><i>If the allocation of the time addressed to these activities has changed during your stay at LHC, please indicate an average percentage.</i></p>	<table border="1"> <tr> <td>Working on experiments (e.g. data analysis)</td> <td></td> </tr> <tr> <td>Writing thesis/papers/articles</td> <td></td> </tr> <tr> <td>Participation to meetings/dealing with coordination activities (e.g. managing working groups, etc.)</td> <td></td> </tr> <tr> <td>Participation to conferences and workshops</td> <td></td> </tr> <tr> <td>Participation to other training activities</td> <td></td> </tr> <tr> <td>Outreach activities (e.g. guide to visitors)</td> <td></td> </tr> <tr> <td>Other activities, please specify:</td> <td></td> </tr> </table>	Working on experiments (e.g. data analysis)		Writing thesis/papers/articles		Participation to meetings/dealing with coordination activities (e.g. managing working groups, etc.)		Participation to conferences and workshops		Participation to other training activities		Outreach activities (e.g. guide to visitors)		Other activities, please specify:																							
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Other activities, please specify:																																						
<b>B.6</b>	<p><b>How do you rate the importance of the following considerations on your decision of applying for a research period at LHC?</b></p> <p><i>Please, provide a rate from 1 (= not important) to 5 (= very important) to each of the following items by keeping in mind that they are not mutually exclusive:</i></p>	<table border="1"> <thead> <tr> <th></th> <th>1</th> <th>2</th> <th>3</th> <th>4</th> <th>5</th> </tr> </thead> <tbody> <tr> <td>Deepening the knowledge and competences in the scientific domain of interest</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Develop new professional skills</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>World undisputed prestige of CERN</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Possibility to work with world class physicists</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Working in an international environment</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table>		1	2	3	4	5	Deepening the knowledge and competences in the scientific domain of interest						Develop new professional skills						World undisputed prestige of CERN						Possibility to work with world class physicists						Working in an international environment					
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Possibility to work with world class physicists																																						
Working in an international environment																																						

		Other, please specify:					
<b>B.7</b>	<p><b>To what extent the following skills have been improved thanks to the experience at LHC?</b>  Please, provide a rate from 1 (= not decisive) to 5 (= very decisive) to each of the following items by keeping in mind that they are not mutually exclusive:</p>		<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
		Scientific skills					
		Technical skills					
		Communication skills					
		Problem-solving capacity					
		Team/project leadership					
		Developing, maintaining and using networks of collaborations					
		Independent thinking/critical analysis/creativity					
		Other skills, please specify:					
<b>B.8</b>	<p><b>Going back in time, shouldn't you had the opportunity to join the activity on LHC, what would you have done as an alternative?</b>   You can indicate more than one option</p>	<input type="checkbox"/> I would have applied for a research period on another experiment at CERN <input type="checkbox"/> I would have applied for a research period at another international research institute (other than CERN) <input type="checkbox"/> I would have applied for a research period at another national research institute (other than CERN) <input type="checkbox"/> I would have applied for a job in academia <input type="checkbox"/> I would have applied for a job in the industry sector <input type="checkbox"/> I would have applied for a job in the financial sector <input type="checkbox"/> I would have applied for a job in the IT sector Other, please specify:					
<b>B.9</b>	<p><b>As of today, how many of the following have you authored/co-authored in relation to your research activity at LHC?</b>  Please, indicate the total number for each of the following items</p>	Working papers/preprints:					
		Articles in refereed journals:					
		Papers for conference proceedings:					
		Section/chapter in book:					
		Patent:					
		Software/application:					
		Multimedia products:					
		Other, please specify:					
<b>B.10</b>	<p><b>Please indicate to which of the following experiments or research projects (other than the one indicated in question B.0), carried out at CERN, you have contributed for a period of at least one month.</b></p>	<input type="checkbox"/> ACE <input type="checkbox"/> AEGIS <input type="checkbox"/> ALICE <input type="checkbox"/> ALPHA <input type="checkbox"/> AMS <input type="checkbox"/> ASACUSA	<input type="checkbox"/> LHC machine <input type="checkbox"/> HiLumi LHC <input type="checkbox"/> LIU (Injector Upgrade) <input type="checkbox"/> ISOLDE <input type="checkbox"/> LHCb <input type="checkbox"/> LHCf				

		<input type="checkbox"/> ATLAS <input type="checkbox"/> ATRAP <input type="checkbox"/> AWAKE <input type="checkbox"/> CAST <input type="checkbox"/> CLOUD <input type="checkbox"/> CMS <input type="checkbox"/> COMPASS <input type="checkbox"/> DIRAC	<input type="checkbox"/> MOEDAL <input type="checkbox"/> NA61/SHINE <input type="checkbox"/> NA62 <input type="checkbox"/> nTOF <input type="checkbox"/> OSQAR <input type="checkbox"/> TOTEM <input type="checkbox"/> UA9			
		Please specify your activity:				
<b>B.11</b>	<b>Please, indicate the total duration of your research period at CERN, including the activity indicated in question B.0 and others experiments/activities, if any.</b>	Number of months				
<b>YOUR CURRENT POSITION</b>						
	<b>What is your current position?</b>	<input type="checkbox"/> I am still studying	<b>GO TO SECTION C</b>			
		<input type="checkbox"/> I have completed my studies and I am currently unemployed	<b>GO TO SECTION C</b>			
		<input type="checkbox"/> I am a post-doc researcher/ am working	<b>GO TO SECTION D</b>			
<b>PART C – YOUR EXPECTATIONS ABOUT YOUR PROFESSIONAL CAREER</b>						
<b>C.1</b>	<b>Overall, to what extent do you expect that your experience at LHC will be relevant to your professional career? Please, provide an overall rate from 1 (= not relevant) to 5 (= very relevant).</b>	1	2	3	4	5
<b>C.2</b>	<b>We would like to understand the impact that do you expect your experience at LHC will have on your salary. Please, answer to the following question by possibly thinking to somebody who has not been accepted at your experiment or other experiments at CERN.</b>	<b>To which extent do you expect that your future salary will be higher than that earned by somebody else?</b> <input type="checkbox"/> 0% <input type="checkbox"/> up to 5% <input type="checkbox"/> 5%, 10% <input type="checkbox"/> 11% , 20% <input type="checkbox"/> 21% , 30% <input type="checkbox"/> more than 30%				
<b>C.3</b>	<b>Please indicate your expectations about the SECTOR of your professional experience immediately after completing the studies. In case you have completed your studies and you are currently unemployed, please indicate the SECTOR of your most desired professional experience</b> You can indicate more than one option	<input type="checkbox"/> Research (at CERN) <input type="checkbox"/> Research (other than CERN) <input type="checkbox"/> University <input type="checkbox"/> Other teaching <input type="checkbox"/> Industry <input type="checkbox"/> ICT sector (e.g. computing) <input type="checkbox"/> Financial sector <input type="checkbox"/> Public administration <input type="checkbox"/> Other, please specify				
<b>C.4</b>	<b>Please indicate the POSITION expected to be covered during your professional experience immediately after completing the studies. In case you have completed your studies and</b>	<input type="checkbox"/> General Manager <input type="checkbox"/> Account Manager <input type="checkbox"/> Administrative/Office Manager <input type="checkbox"/> Finance manager				

	<p><b><i>you are currently unemployed, please indicate the <u>POSITION</u> of your most desired professional experience</i></b></p> <p><i>You can indicate more than one option</i></p>	<input type="checkbox"/> Software engineer <input type="checkbox"/> Mechanical engineers <input type="checkbox"/> Applications engineers <input type="checkbox"/> Engineering technician <input type="checkbox"/> Financial analyst <input type="checkbox"/> Data analyst <input type="checkbox"/> Physicist <input type="checkbox"/> Professor <input type="checkbox"/> Associate Professor <input type="checkbox"/> Lecturer/Assistant Professor <input type="checkbox"/> Post doc <input type="checkbox"/> Researcher <input type="checkbox"/> Other, please specify
<p><b>C.5</b></p>	<p><b><u>STARTING SALARY</u></b></p> <p><b><i>What is the approximate <u>gross</u> annual salary do you expect to earn during your first professional experience (desired experience if you are currently unemployed)?</i></b></p>	<input type="checkbox"/> less than 30,000 EUR <input type="checkbox"/> 30,000 – 40,000 EUR <input type="checkbox"/> 41,000 - 50,000 EUR <input type="checkbox"/> 51,000 - 60,000 EUR <input type="checkbox"/> 61,000 - 70,000 EUR <input type="checkbox"/> 71,000 - 80,000 EUR <input type="checkbox"/> 81,000 - 90,000 EUR <input type="checkbox"/> 91,000 - 100,000 EUR <input type="checkbox"/> 101,000 - 150,000 EUR <input type="checkbox"/> more than 150,000 EUR
<p><b>C.6</b></p>	<p><b><u>MID-CAREER SALARY</u></b></p> <p><b><i>What is the approximate <u>gross</u> annual salary do you expect to earn in the mid of your career (desired experience if you are currently unemployed)?</i></b></p> <p><i>Please, note that mid-career salary is the salary that you expect to earn after 10 years of working experience</i></p>	<input type="checkbox"/> less than 30,000 EUR <input type="checkbox"/> 30,000 – 40,000 EUR <input type="checkbox"/> 41,000 - 50,000 EUR <input type="checkbox"/> 51,000 - 60,000 EUR <input type="checkbox"/> 61,000 - 70,000 EUR <input type="checkbox"/> 71,000 - 80,000 EUR <input type="checkbox"/> 81,000 - 90,000 EUR <input type="checkbox"/> 91,000 - 100,000 EUR <input type="checkbox"/> 101,000 - 150,000 EUR <input type="checkbox"/> more than 150,000 EUR
<p><b>C.7</b></p>	<p><b><u>END-CAREER SALARY</u></b></p> <p><b><i>What is the approximate <u>gross</u> annual salary that you expect to earn at the end of your professional career?</i></b></p>	<input type="checkbox"/> less than 30,000 EUR <input type="checkbox"/> 30,000 – 40,000 EUR <input type="checkbox"/> 41,000 - 50,000 EUR <input type="checkbox"/> 51,000 - 60,000 EUR <input type="checkbox"/> 61,000 - 70,000 EUR <input type="checkbox"/> 71,000 - 80,000 EUR <input type="checkbox"/> 81,000 - 90,000 EUR <input type="checkbox"/> 91,000 - 100,000 EUR <input type="checkbox"/> 101,000 - 150,000 EUR <input type="checkbox"/> more than 150,000 EUR
<b>PART D – YOUR PROFESSIONAL CAREER</b>		
<b>THE IMPACT OF YOUR EXPERIENCE AT LHC ON YOUR PROFESSIONAL CAREER</b>		

D.1	<p><b>Overall, to what extent your experience at LHC has been relevant to your professional career?</b> Please, provide an overall rate from 1 (= not relevant) to 5 (= very relevant)</p>	1	2	3	4	5		
D.2	<p><b>Thinking to the possibility you had not joined the LHC, please indicate the extent to which you agree with the following statements about your PROFESSIONAL PATH.</b> Please, provide a rate from 1 (= strongly disagree) to 5 (= strongly agree) to each of the following items:</p>	<p><i>If I hadn't had the chance to join the LHC...</i></p>		1	2	3	4	5
		<p><i>I would not have had difficulties to join an equivalent current job position</i></p>						
		<p><i>I would have taken more time to find an equivalent current job position</i></p>						
		<p><i>I would have been forced to look for job opportunities in other sectors outside the research sector</i></p>						
		<p><i>Other, please specify:</i></p>						
D.3	<p><b>Thinking to the possibility you had not joined the LHC, please indicate the extent to which you agree with the following statements about your SALARY.</b></p>	<p><i>If I hadn't had the chance to join the LHC ...</i></p>		1	2	3	4	5
		<p><i>I would have had a lower capacity to negotiate my salary and additional benefits with my employers</i></p>						
		<p><i>I would have received the same salary</i></p>						
		<p><i>I would have had few probabilities to increase my salary in the long-term</i></p>						
		<p><i>Other, please specify:</i></p>						
D.4	<p><b>We would like to understand the impact of your experience at LHC on your salary.</b> Please, answer to the following question by possibly thinking to somebody who has not been accepted at your experiment or other experiments at CERN.</p>	<p><b>Thinking about that, to which extent is your CURRENT SALARY higher than that earned by somebody else.</b></p> <p><input type="checkbox"/> 0%  <input type="checkbox"/> up to 5%  <input type="checkbox"/> 5%, 10%  <input type="checkbox"/> 11% , 20%  <input type="checkbox"/> 21% , 30%  <input type="checkbox"/> more than 30%</p> <p><b>Looking at your professional career in the long-term, to which extent, do you expect, your FUTURE SALARY will be higher than that earned by somebody else.</b></p> <p><input type="checkbox"/> 0%  <input type="checkbox"/> up to 5%  <input type="checkbox"/> 5%, 10%  <input type="checkbox"/> 11% , 20%  <input type="checkbox"/> 21% , 30%  <input type="checkbox"/> more than 30%</p>						



FIRST CAREER MOVE		
D.5	<i>Please, indicate the year of start of your professional career</i>	List of Years
D.6	<i>Please, indicate the country of your first professional experience</i>	List of Countries
D.7	<i>With regard to your first professional experience, were you employed or associated at CERN?</i>	<input type="checkbox"/> YES <b>GO TO QUESTION D.7.1</b>
		<input type="checkbox"/> NO <b>GO TO QUESTION D.8</b>
D.7.1	<i>Please, specify your professional category at CERN</i>	<input type="checkbox"/> Staff member <input type="checkbox"/> Apprentice <input type="checkbox"/> Fellow <input type="checkbox"/> User <input type="checkbox"/> Associate <input type="checkbox"/> Other, please specify  <b>GO TO QUESTION D.10</b>
D.8	<i>Please indicate the <u>SECTOR</u> of your first professional experience</i>	<input type="checkbox"/> Research (other than CERN) <input type="checkbox"/> University <input type="checkbox"/> Other teaching <input type="checkbox"/> Industry <input type="checkbox"/> ICT sector (e.g. computing) <input type="checkbox"/> Financial sector <input type="checkbox"/> Public administration <input type="checkbox"/> Other, please specify
D.9	<i>Please indicate the <u>POSITION</u> covered during your first professional experience</i>	<input type="checkbox"/> General Manager <input type="checkbox"/> Account Manager <input type="checkbox"/> Administrative/Office Manager <input type="checkbox"/> Finance manager <input type="checkbox"/> Software engineer <input type="checkbox"/> Mechanical engineers <input type="checkbox"/> Applications engineers <input type="checkbox"/> Engineering technician <input type="checkbox"/> Financial analyst <input type="checkbox"/> Data analyst <input type="checkbox"/> Physicist <input type="checkbox"/> Professor <input type="checkbox"/> Associate Professor <input type="checkbox"/> Lecturer/Assistant Professor <input type="checkbox"/> Post doc <input type="checkbox"/> Researcher <input type="checkbox"/> Other, please specify
D.10	<i>What was the approximate <u>gross</u> annual salary earned during your first professional experience?</i>	<input type="checkbox"/> less than 30,000 EUR <input type="checkbox"/> 30,000 – 40,000 EUR <input type="checkbox"/> 41,000 - 50,000 EUR <input type="checkbox"/> 51,000 - 60,000 EUR <input type="checkbox"/> 61,000 - 70,000 EUR

		<input type="checkbox"/> 71,000 - 80,000 EUR <input type="checkbox"/> 81,000 - 90,000 EUR <input type="checkbox"/> 91,000 - 100,000 EUR <input type="checkbox"/> <i>more than</i> 100,000 EUR
<b>YOUR CURRENT PROFESSIONAL EMPLOYMENT</b>		
<b>D.11</b>	<b><i>Is your current professional employment different from your first professional experience?</i></b>	<input type="checkbox"/> YES <b>GO TO QUESTION D.12</b> <input type="checkbox"/> NO <b>GO TO QUESTION D.15</b>
<b>D.12</b>	<b><i>Please indicate the <u>SECTOR</u> of your current experience</i></b>	<input type="checkbox"/> Research ( <u>other than CERN</u> ) <input type="checkbox"/> University <input type="checkbox"/> Other teaching <input type="checkbox"/> Industry <input type="checkbox"/> ICT sector (e.g. computing) <input type="checkbox"/> Financial sector <input type="checkbox"/> Public administration <input type="checkbox"/> Other, please specify
<b>D.13</b>	<b><i>Please indicate the <u>POSITION</u> covered during your current professional experience</i></b>	<input type="checkbox"/> General Manager <input type="checkbox"/> Account Manager <input type="checkbox"/> Administrative/Office Manager <input type="checkbox"/> Finance manager <input type="checkbox"/> Software engineer <input type="checkbox"/> Mechanical engineers <input type="checkbox"/> Applications engineers <input type="checkbox"/> Engineering technician <input type="checkbox"/> Financial analyst <input type="checkbox"/> Data analyst <input type="checkbox"/> Physicist <input type="checkbox"/> Professor <input type="checkbox"/> Associate Professor <input type="checkbox"/> Lecturer/Assistant Professor <input type="checkbox"/> Post doc <input type="checkbox"/> Researcher <input type="checkbox"/> Other, please specify
<b>D.14</b>	<b><i>What is the approximate <u>gross</u> annual salary earned during your current professional experience?</i></b>	<input type="checkbox"/> less than 30,000 EUR <input type="checkbox"/> 30,000 – 40,000 EUR <input type="checkbox"/> 41,000 - 50,000 EUR <input type="checkbox"/> 51,000 - 60,000 EUR <input type="checkbox"/> 61,000 - 70,000 EUR <input type="checkbox"/> 71,000 - 80,000 EUR <input type="checkbox"/> 81,000 - 90,000 EUR <input type="checkbox"/> 91,000 - 100,000 EUR <input type="checkbox"/> 101,000 - 150,000 EUR <input type="checkbox"/> more than 150,000 EUR
<b>YOUR EXPECTATIONS ABOUT THE FUTURE</b>		

D.15	<p><b>Do you expect to remain in the same <u>SECTOR</u> and to play the same <u>POSITION</u> in the future?</b></p>	<input type="checkbox"/> YES <b>GO TO QUESTION D.18</b> <input type="checkbox"/> NO <b>GO TO QUESTION D.16</b>
D.16	<p><b>Please indicate the expected <u>SECTOR</u> of your future career</b>  <i>You can indicate more than one option</i></p>	<input type="checkbox"/> Research (at CERN) <input type="checkbox"/> Research (other than CERN) <input type="checkbox"/> University <input type="checkbox"/> Other teaching <input type="checkbox"/> Industry <input type="checkbox"/> ICT sector (e.g. computing) <input type="checkbox"/> Financial sector <input type="checkbox"/> Public administration <input type="checkbox"/> Other, please specify
D.17	<p><b>Please indicate the expected <u>POSITION</u> of your future career</b>  <i>You can indicate more than one option</i></p>	<input type="checkbox"/> General Manager <input type="checkbox"/> Account Manager <input type="checkbox"/> Administrative/Office Manager <input type="checkbox"/> Finance manager <input type="checkbox"/> Software engineer <input type="checkbox"/> Mechanical engineers <input type="checkbox"/> Applications engineers <input type="checkbox"/> Engineering technician <input type="checkbox"/> Financial analyst <input type="checkbox"/> Data analyst <input type="checkbox"/> Physicist <input type="checkbox"/> Professor <input type="checkbox"/> Associate Professor <input type="checkbox"/> Lecturer/Assistant Professor <input type="checkbox"/> Post doc <input type="checkbox"/> Researcher <input type="checkbox"/> Other, please specify
D.18	<p><b><u>MID-CAREER SALARY</u></b></p> <p><b>What is the approximate <u>gross</u> annual salary do you expect to earn in the mid of your career?</b>  <i>Please, note that mid-career salary is the salary that you expect to earn after 10 years of working experience</i></p>	<input type="checkbox"/> less than 30,000 EUR <input type="checkbox"/> 30,000 – 40,000 EUR <input type="checkbox"/> 41,000 - 50,000 EUR <input type="checkbox"/> 51,000 - 60,000 EUR <input type="checkbox"/> 61,000 - 70,000 EUR <input type="checkbox"/> 71,000 - 80,000 EUR <input type="checkbox"/> 81,000 - 90,000 EUR <input type="checkbox"/> 91,000 - 100,000 EUR <input type="checkbox"/> 101,000 - 150,000 EUR <input type="checkbox"/> more than 150,000 EUR
D.19	<p><b><u>END-CAREER SALARY</u></b></p> <p><b>What is the approximate <u>gross</u> annual salary that you expect to earn at the end of your professional career?</b></p>	<input type="checkbox"/> less than 30,000 EUR <input type="checkbox"/> 30,000 – 40,000 EUR <input type="checkbox"/> 41,000 - 50,000 EUR <input type="checkbox"/> 51,000 - 60,000 EUR <input type="checkbox"/> 61,000 - 70,000 EUR <input type="checkbox"/> 71,000 - 80,000 EUR <input type="checkbox"/> 81,000 - 90,000 EUR <input type="checkbox"/> 91,000 - 100,000 EUR <input type="checkbox"/> 101,000 - 150,000 EUR <input type="checkbox"/> more than 150,000 EUR