# Abstract Submission

# P2_04

*T2 - Planetary interiors*
*High-pressure oxide phases: Mineralogy, crystallography and implications for the deep Earth and other planetary interiors*

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**Complex electronic, magnetic, and structural transformations in FeO**

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**Abstract Content:** Iron oxides are important materials for Geoscience but also for basic science and applied technologies [1, 2]. Iron monoxide is likely to be the final constituent of the evolution of subducted banded iron formations and might be a source of the low-velocity zones at the Earth's core-mantle boundary [3]. The stability and high-pressure properties of $Fe_xO$ could, thus, determine the fate of banded iron formations and their potential role in processes in Earth and planetary interiors, including controls on redox cycles.

$Fe_xO$ transforms from B1 structure into rhombohedral distorted-B1 phase (rB1) at about 16 GPa, which correlates with a transition from the paramagnetic state to the state with the antiferromagnetic order [4]. A further transition from the rB1 phase to a hexagonal B8 phase has been proposed at 74 GPa and 900 K [5]. Although numerous studies were focused on the investigation of the electronic and magnetic properties and phase diagram of $Fe_xO$, information on the $Fe^{2+}/Fe^{3+}$ interplay, magnetic and structural coupling of $Fe_xO$ at high pressures and high temperature are very limited, e.g. he pressure dependence of the Néel temperature of $Fe_xO$ was determined only up to 40 GPa under non-hydrostatic conditions [4].

We will present our investigation on the pressure dependence of the electronic, magnetic and structural properties of $Fe_xO$ by means of Synchrotron Mössbauer Source spectroscopy and Single-Crystal X-ray diffraction in resistively- and laser-heated diamond anvil cells. We will discuss the interplay between $Fe^{2+}$ and $Fe^{3+}$ and its effects on the magnetic properties of $Fe_xO$ and their potential role in the mineralogy, chemistry, and physics of the Earth's deep interior.

**References:** [1] I. Kupenko, G. Aprilis, D. M. Vasiukov, et al., Nature **570**, 102 (2019). [2] S. V. Ovsyannikov, M. Bykov, E. Bykova, et al., Nat. Chem. **8**, 501 (2016). [3] D. P. Dobson & J. P. Brodholt, Nature **434**, 371 (2005). [4] I. Kantor, L. Dubrovinsky, C. Mccammon, et al., Phase Transit. **80**, 1151–1163 (2007). [5] Y. W. Fei and H. K. Mao, Science **266**, 1678 (1994).

**Disclosure of Interest**: None Declared