Book of Abstracts

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Spin canting in EuFe$_2$As$_2$-based superconductors as seen by $^{151}$Eu Mössbauer spectroscopy

K. Komędera$^1$, A. Błachowski$^1$, J. Żukrowski$^2$, L. M. Tran$^3$, M. Babij$^3$, and Z. Bukowski$^3$

$^1$ Mössbauer Spectroscopy Laboratory, Institute of Physics, Pedagogical University, 30-084 Kraków, ul. Podchorążych 2, Poland
$^2$ Academic Centre for Materials and Nanotechnology, AGH University of Science and Technology, 30-059 Kraków, al. A. Mickiewicza 30, Poland
$^3$ Institute of Low Temperature and Structure Research, Polish Academy of Sciences, 50-422 Wrocław, ul. Okólna 2, Poland

EuFe$_2$As$_2$-based parent compound and Co-doped superconductors were studied by $^{57}$Fe and $^{151}$Eu Mössbauer spectroscopy versus temperature [1]. The parent compound exhibits 3d-Fe itinerant magnetic order of spin density wave (SDW) and 4f-Eu localized antiferromagnetism. These two magnetic systems remain uncoupled one to another. The SDW is suppressed by Co substitution, but superconductors remains in the inhomogeneous state with some volume being free of 3d magnetism, while the remainder exhibits weak SDW. On the other hand, Eu orders magnetically regardless of the Co concentration, so superconductivity coexists with the 4f-Eu magnetic order. It was found that doping leading to superconductivity causes 4f-Eu magnetic moment reorientation (canting) from the a-axis on the c-axis of the unit cell with a generation of the 4f ferromagnetic component. Iron experiences some transferred hyperfine magnetic field due to the europium ordering for substituted samples (especially for superconductors), while the transferred magnetic field from the Eu on the Fe is undetectable in the parent compound. It can be concluded that 4f-Eu spin canting ferromagnetism is coupled with 3d-Fe superconductivity.


* kamila.komedera@up.krakow.pl