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**Spin density wave in the parent compounds
of '122' iron-based superconductors**

A. BŁACHOWSKI¹, K. RUEBENBAUER¹, J. ŻUKROWSKI²,
K. ROGACKI³, Z. BUKOWSKI^{3,4}, J. KARPINSKI⁴

¹Mössbauer Spectroscopy Division, Institute of Physics, Pedagogical University, Cracow, Poland; sfrueben@cyf-kr.edu.pl

² Solid State Physics Department, Faculty of Physics and Applied Computer Science, AGH University of Science and Technology, Cracow, Poland

³ Institute of Low Temperature and Structure Research,
Polish Academy of Sciences, Wrocław, Poland

⁴ Laboratory for Solid State Physics, ETH Zürich, Zürich, Switzerland

Parent compounds of the iron-based superconductors belonging to the '122' family have the composition AFe_2As_2 with $A=Ca, Sr, Ba, Eu$. We have investigated compounds with $A=Ca, Ba, Eu$ [1] by means of the ^{57}Fe Mössbauer spectroscopy in the temperature range 4.2-300K. Parent compounds develop iron-based itinerant magnetism of the spin density wave (SDW) character. The SDW "propagates" along the tetragonal/orthorhombic a -axis and it has longitudinal antiferromagnetic character. It is incommensurate with the crystal lattice period in the "propagation" direction. The shape of SDW is very unusual as it consists of many (odd) harmonics. It resembles almost separated magnetic sheets ordered in the alternate fashion and having maximum amplitude not much smaller than the saturation field at the onset of the magnetic order. The sheets expand at the base with lowering temperature to the quasi-triangular shape, and finally they form a quasi-rectangular wave close to saturation. The square root from the mean squared amplitude of SDW exhibits two regions, i.e., the low temperature coherent region below characteristic temperature T_c , and a high temperature incoherent region extending from T_c till higher lying transition from the orthorhombic (low temperature) to the tetragonal (high temperature) phase. The critical exponents are typical for the universality class (1,2) in the coherent region, i.e., typical for antiferromagnetic Ising-type system having one dimension in the spin space and two dimensions in the real space.

[1] A. Błachowski, K. Ruebenbauer, J. Żukrowski, K. Rogacki, Z. Bukowski, J. Karpinski, Phys. Rev. B **83**, 134410 (2011).