Activity at Home University:
Research Faculty III at the MagLab (equivalent to Full Research Professor at FSU)
Research field:
Electron Spin/Paramagnetic Resonance at (very) high frequencies and magnetic fields (HFESR/EPR); Far-Infrared Magnetic Spectroscopy (FIRMS)
Research interest and experience:
Coordination chemistry of transition metals from the perspective of (a) catalytic activity, (b) bioinorganic chemistry and (c) single-molecule magnetic properties.

Dr Jerzy Krzystek

National High Magnetic Field Laboratory (MagLab),
Florida State University, Tallahassee, USA

will deliver a lecture titled:

"Single-Molecule Magnetism: History, Current Trends and Application of High-field Electron Paramagnetic Resonance Methods"

This year marks the 33rd anniversary of the seminal communication by Caneschi *et al.* on the magnetism of the famous $Mn_{12}Ac$ cluster [1]. It spurred a generation of research on the properties of so-called single-molecule magnets (SMMs). This, in turn, gave an immense boost to several areas of research and technical development, among them coordination chemistry, and magnetic resonance. Coordination chemistry excelled in designing ligands coordinating to transition metal ions, thus modulating the magnetic properties of the resulting clusters. Magnetic resonance, and specifically high-frequency and -field electron paramagnetic resonance (HFEPR) in turn spectacularly succeeded in investigating the intimate interactions within the clusters, since the primary phenomenon responsible for their magnetic properties, zero-field splitting (ZFS) falls fortuitously almost exactly in the sub-terahertz wave frequency range and magnetic fields used in that technique [2].

In my presentation I will review the history and development of single-molecule magnetism from clusters to single ions and from transition metals to lanthanides and actinides. I will also discuss the current status of the field, as well as its projected future including potential applications. Given my background, I will heavily concentrate on the application of HFEPR in this area.

[1] A.Caneschi, D. Gatteschi, R. Sessoli, *J. Am. Chem. Soc.*, 1991, **113**, 5874-5876.
[2] A.-L. Barra, D. Gatteschi, R. Sessoli, *Phys. Rev. B,* 1997, **56**, 8192-8198.