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Nuclear techniques for studying soft matter at ISOLDE/CERN

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Due to the complexity of "living systems" nuclear techniques are not commonly used in biology and biochemistry even though they offer powerful insights to local properties. The ISOLDE facility is, however, a perfect place to carry out experiments with Perturbed Angular Correlation of γ-rays (PAC) spectroscopy. This technique is suitable for addressing different biological problems, such as: heavy metal ion - protein interaction, dynamics of protein folding or protein – protein interaction, providing information on the molecular and electronic structure at the metal site [1]. A short overview of recent ISOLDE studies on *de novo* designed peptides, natural proteins, plants and bacteria will be presented.

Furthermore, recently a new avenue of research in the fields of wet chemistry and biochemistry has been opened at ISOLDE: β-NMR spectroscopy has been successfully applied in the first ever experiment on liquid samples. The method is over a billion times more sensitive than conventional NMR on liquids and thus may be applied to elements which are otherwise difficult to explore spectroscopically, such as Mg^{2+}, Zn^{2+} or Cu^{+}. The setup and the first β-NMR results of ^{31}Mg implanted into an ionic liquid will be shown [2].

[1] L. Hemmingsen et al., Chem. Rev. 2004, 104, 4027;
[2] M. Stachura et al., manuscript in preparation.