

General ILL Seminar

Organised by College III

Monday, 23 March 2020 at 11h00
Seminar room 7/8, ILL 1

“ Probing fundamental properties of the weak interaction with trapped atoms and ions ”

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Nuclear β decay has a long-standing history of shaping and testing the standard model of particle physics, and it continues to this day with elegant, ultra-precise low-energy nuclear measurements. Experiments observing the angular correlations between the electron, neutrino and recoil momenta following the β decay of (un)polarized nuclei can be used to search for exotic currents contributing to the dominant $V-A$ structure of the weak interaction. Precision measurements of the correlation parameters to $< 0.1\%$ would be sensitive to (or meaningfully constrain) new physics, complementing other searches at large-scale facilities like the LHC.

Ion and atom traps provide an ideal source of very cold, short-lived radioactive nuclei in an extremely clean and open environment. As such, they are invaluable tools for precision measurements of β -decay parameters. This talk will focus on two such efforts. The TAMUTRAP facility at the Cyclotron Institute, Texas A&M University, will utilize the our recently commissioned cylindrical Penning trap – the world’s largest with an inner diameter of 180 mm – to search for scalar currents via the β - ν correlation in the β -delayed proton decay of $T = 2$ nuclei. The other effort, based at TRIUMF in Vancouver, Canada, utilizes neutral atom-trapping techniques with optical pumping methods to highly polarize ($> 99\%$) short-lived ^{37}K atoms. Building on our recent measurement of the β asymmetry parameter, A_β , to 0.3% precision, we are poised to reach better than 0.1% precision in our upcoming experiment.

Caterina Michelagnoli (College III Secretary)

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