Contribution ID: **2** Type: **Accepted**

Beta delayed fission studies of the neutron deficient Tl and Fr nuclei.

Friday 10 December 2010 11:30 (20 minutes)

The beta delayed fission (βDF) (EC/β +) is a rare nuclear process which couples fission and beta decay. In this process, a parent nucleus undergoes beta decay, possibly populating high-lying states in the daughter nucleus, close to the top of the fission barrier, thus allowing the fission of the daughter to be competitive with other decay modes.
This process is expected to occur in the heavy nuclei in the actinide region (N/Z ˜ 1.5-1.6) due to their small fission barrier, but it is also likely in lighter nuclei, in particular, in the neutron-deficient region from Tl to Bi. The uniqueness of βDF in the lead region lies in the possibility of reaching exotic nuclei with an unusual N/Z ratio, e.g. N/Z=1.25 for 180 Tl, which do not undergo spontaneous fission, and thus, it allows the investigation of their low-energy fission properties.
This talk presents the recent IS466 experiment at ISOLDE facility (June/July 2010) in which a search for βDF decay of isotopes 178–184 Tl and 202 Fr has been performed. A novelty and key feature of this work was the production of pure sources of Tl isotopes using resonant laser ionization (RILIS), followed by mass separation (GPS).
Preliminary evidence for βDF of 178 Tl and of 202 Fr was obtained and will be discussed in the presentation. Moreover, measurements of the isotopes 178 Tl, 180 Tl, and 181 Tl have been carried out, which will allow data on the isotope shift to be deduced.

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Session Classification: Heavy Mass Nuclei