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Status of Lamb-shift polarized ion source at 6 MV tandem accelerator in UTTAC and its application to nuclear physics

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A polarized ion source has contributed to the development of the nuclear physics, as represented by the measurement of analyzing power. At University of Tsukuba Tandem Accelerator Complex (UTTAC), a Lamb-shift polarized ion source (PIS) is operated as one of the injections of 6 MV tandem accelerator. The PIS can produce highly negative polarized proton and deuteron beams. The PIS was damaged seriously ten years ago due to the Great East Japan Earthquake, but was recovered successfully within five years. Currently, the polarized proton and deuteron beams which are accelerated up to 12 MeV can be transported to the experimental course with approximately 100 nA and 10 nA for proton and deuteron beams, respectively. One of application to nuclear physics is the production of polarized unstable nuclei via polarization transfer reactions with polarized proton or deuteron beams. Up to now, we succeeded to produce polarized unstable nuclei for ^{25}Al ($J = 5/2+$, $T_{1/2} = 7.183$ s) and ^{29}P ($J = 1/2+$, $T_{1/2} = 4.142$ s). In addition, we observed nuclear magnetic resonances (NMR) of them with the beta-ray detected NMR technique. In this presentation, we will talk about the current status of the PIS and experimental results related to the PIS.

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