Search for tensor couplings in the weak interaction: a study of the ^{6}He β-decay in a Paul trap.

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In the Standard Model, the weak interaction is described in terms of vector and axial-vector couplings. These two components are dominant but other couplings (scalar and tensor) are also allowed by extensions to the Standard Model. The existence of 'exotic' couplings can be tested by a precise measurement of the β-ν angular correlation parameter *a* in nuclear beta decay. In the case of ^{6}He, the ratio of tensor and axial-vector couplings can be determined. Up to now, the best limit on tensor interaction has been obtained by Johnson et al. in 1963 [1]. The goal of the experiment is to improve this result. The LPCTrap experiment is intended to measure *a* using an electromagnetic trap. The $^6He^+$ ions are confined in a new transparent Paul trap allowing the detection in coincidence of both the β-particle and the recoil ion. Thus, the complete kinematics of the decay can be reconstructed. The *a* parameter can then be extracted from the time of flight spectrum of the recoil ions.

The setup of the LPCTrap experiment is installed on the low energy beam line LIRAT of the SPIRAL/GANIL facility. The incoming ions are first cooled and bunched by a Radio Frequency Quadrupole using the buffer gas technique [2]. The extracted ions bunches are then injected in the transparent Paul trap where ions are almost at rest. The detection setup enables to detect the positions and energies of the β-particle and the recoil ion. The first $^6He^+$ decay events were observed in May 2005 during a commissioning run and a second run is scheduled in July 2006.

[1] C.H. Johnson, F. Pleasonton et T.A. Carlson, Phys. Rev. **132**, 1149 (1963)
[2] G. Ban et al., Nucl. Instr. And. Meth. A **518**, 712 (2004)

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