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Search for Pauli Exclusion Principle violating electrons at LNGS

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Formulated by Wolfgang Pauli in 1925 [1], the Pauli Exclusion Principle (PEP) has been the foundation for our understanding of all the elds of physics where many-fermion systems are concerned. Since no simple explanation for the principle exists, it remains to be a postulate open to experimental tests, which are dicult as there is no well-established theory to clearly quantify a possible small amount of violation.
However there have been high precision experiments that search for possible small violation of PEP in the framework of Quantum Mechenics. In the rst of such experiments, Ramberg and Snow [2] supplied electric current to a Cu target, and searched for PEP violating atomic transitions of the \fresh" electrons from the current. The result for the non-exsistence of the anomalous X-rays from such transitions then set the upper limit for the probability that PEP can be violated. Following this method, the VIP (VIolation of Pauli Exclusion Principle) experiment improved the sensitivity due to eective background reduction, by performing the measurement at the Gran Sasso underground laboratory (LNGS), and set an upper limit at the level of 10⁻29 [3,4], for the probability that an external electron captured by a Cu atom can de-excite to the 1s state already occupied by two electrons.
In this talk, topics mentioned above will be discussed in detail. The prepartion for our follow-up experiment planned at Gran Sasso[5], aiming to increase the sensitivity by two orders of magnitude, will also be introduced.

[1] W. Pauli, Z. Phys. 31, 765(1925);
[2] E. Ramberg and G.A. Snow, Phys. Lett. B238, 438{441(1990);
[3] S. Bartalucci, et al:, Phys. Lett. B641, 18{22(2006);
[4] C. Curceanu, et al:, AIP Conf. Proc. 1508, 136(2012); doi: 10.1063/1.4773125;
[5] J. Marton, et al:, J. Phys.: Conf. Ser. 447, (2013)012070

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