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Catalysis of Nuclear Reactions by Electrons

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Electron screening enhances nuclear reaction cross sections at low beam energies. This happens in many astrophysical scenarios, e.g. stellar burning or supernova explosions. Unfortunately, the process is still poorly understood. All currently used calculations are based on the very simple assumption that the electrons distributed evenly on a shell decrease the repulsive potential inside the shell by a constant. Although the measurements in principle obey the predicted functional behavior of electron screening, its magnitude is severely underestimated by the theory. I will overview the current experimental situation and propose an alternative understanding of the electron screening process with a possible proof of its validity.

Primary author: Dr LIPOGLAVSEK, Matej (Jozef Stefan Institute, Ljubljana, Slovenia)

Presenter: Dr LIPOGLAVSEK, Matej (Jozef Stefan Institute, Ljubljana, Slovenia)

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