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Electron Captures in Magnetic White Dwarfs and Magnetars

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Electron captures by atomic nuclei in dense matter are among the most important processes governing the late evolution of stars. Although these reactions have been known for a long time, most studies have focused on nonmagnetized matter. However, some white dwarfs are endowed with magnetic fields of the order of 10^9~G. Even more extreme magnetic fields might exist in super Chandrasekhar white dwarfs, the progenitors of overluminous type Ia supernovae like SN 2006gz and SN 2009dc. The onset of electron captures, which limits the stability of the most massive white dwarfs, may be shifted to higher or lower densities depending on the magnetic field strength due Landau-Rabi quantization of electron motion [[1],[2]]. Electron captures could also be a viable internal heating mechanism to power the observed persistent thermal luminosity of magnetars and their outbursts [[3]]. During this talk, I will briefly review our recent studies of the role of a strong magnetic field on electron captures in these extreme stellar environments.

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Primary authors: CHAMEL, Nicolas (Université Libre de Bruxelles (Belgium)); Dr FANTINA, Anthea (GANIL (France)); Ms SULEIMAN, Lami (CAMK (Poland)); Prof. ZDUNIK, Julian Leszek (CAMK (Poland)); Prof. HAENSEL, Pawel (CAMK (Poland))

Presenter: CHAMEL, Nicolas (Université Libre de Bruxelles (Belgium))

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