

Rate Measurement of the Nuclear Excitation by Electron Capture process

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In extremely hot and dense astrophysical plasmas, high-Z atomic nuclei become highly ionized and the nucleus can couple to the atomic system via processes like electron capture (NEEC) or electronic transition, resulting in the nucleus being in an excited state, which can affect nuclear properties in scenarios like the r process. The NEEC rate is presently controversial, with a claimed observation differing from theory by nine orders of magnitude. We will develop a storage ring measurement technique to determine the NEEC rate unambiguously by observing the nuclear excitation in coincidence with electron capture.

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