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Spontaneous Excitation of Intermittent Electron Currents in an ECR Discharge Plasma SHINJI YOSHIMURA, TOMOHIRO MORISAKI, National Institute for Fusion Science, KAZUYA FURUTA, Toshiba Co., YOSHIYUKI KATO, KENICHIRO TERASAKA, MASAYOSHI Y. TANAKA, Kyushu University — Laboratory plasmas are intrinsically non-equilibrium open system in which energy and particles are being injected and exhausted continuously; such systems exhibit various intermittent behaviors. Recently, the spontaneous excitation of 1-cycle magnetic pulses has been observed in an electron cyclotron resonance (ECR) discharge plasma produced in the HYPER-I device at the National Institute for Fusion Science. Simultaneous measurement using two magnetic probes and a directional Langmuir probe revealed that the magnetic pulses were excited by intermittent electron currents, or high-energy electron fluxes, along the magnetic field. The energy distribution of those electrons was examined by a retarding field analyzer. We also developed a wire-grid probe which consists of 16 electrically floated electrodes to measure the two-dimensional profile of the high-energy electrons. Since the occurrence of high-energy electron fluxes appeared to be random in time and space, we applied several statistical analyses to the intermittent events. The waiting time analysis demonstrated an exponential-like distribution, which implies the stochastic nature of the events.

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