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# Finding of non-adiabatic electron acceleration in kinetic-size magnetic holes.

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The magnetic-to-particle energy conversion is one of the most fundamental physics processes to laboratory, space and astrophysical contexts. Adiabatic acceleration processes in moderate varying environment merely play significant roles to generate devastating cosmic rays and spectacular aurorae, etc. More commonly, when the violent variation or strongly inhomogeneity in electromagnetic field distorts the trajectory of the particles, non-adiabatic acceleration processes function more transiently and drastically on particle energization trigger explosive phenomena like sudden solar flares. However, without high-resolution simultaneous measurements on plasma and field at previous space missions, the small/fast scale of the non-adiabatic processes make it difficult to be analyzed to reach a comprehensive understanding to most of the underlying non-adiabatic acceleration mechanisms in space and astrophysical contexts. Here, using MMS data with unprecedented high temporal resolutions, we report such finding of acceleration for electrons trapped in a kinetic-size magnetic holes which at the same time is the acceleration region, and demonstrate the validity of the acceleration process by numerical simulation, achieving the reproduction for the observation.