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Non-Kondo mechanism of resistivity upturn in a spin-ice Kondo lattice model YUKITOSHI MOTOME, Dept. Appl. Phys., Univ. of Tokyo, MASAFUMI UDAGAWA, Dept. Appl. Phys., Univ. of Tokyo, MPI-PKS, Dresden, HIROAKI ISHIZUKA, Dept. Appl. Phys., Univ. of Tokyo — Ice rule is a configurational constraint observed in a broad range of systems in which two-state variables are defined at the vertices of a pyrochlore lattice. The constraint enforces the so-called 'two-in two-out' configuration; two out of four neighboring sites within each tetrahedron are in the opposite state to the other two. Under this peculiar local constraint, the system remains disordered, whereas the ground state is characterized by macroscopic degeneracy with a hidden gauge structure. Recent experiments on pyrochlore metallic oxides have promoted interest in itinerant electrons coupled with such ice-rule type localized moments. Here we investigate how electronic and transport properties are affected by the coupling to the spin ice by applying a cellular dynamical mean-field theory to a spin-ice type Kondo lattice model. We found that a spin-ice liquid state emerges in a wide temperature range at low electron density, in which two-in two-out local correlation well develops in the absence of long-range ordering. In this spin liquid state, the resistivity shows an upturn because of an anomalous scattering of electrons by the local spin-ice type correlation. The details of this non-Kondo resistivity upturn will be discussed in relation with experiments in pyrochlore oxides.

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