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Field-induced ordering in dipolar spin ice[1] YING-JER KAO, WEN-HAN KAO, Natl Taiwan Univ, PETER HOLDSWORTH, Universit de Lyon — We present numerical studies of dipolar spin ice in the presence of a magnetic field slightly tilted away from the [111] axis. We find a first-order transition from a kagome ice to a $\mathbf{q}$ =X state when the external field is tilted toward the $[11\bar{2}]$ direction. This is consistent with the anomalous critical scattering previously observed in the neutron scattering experiment on the spin ice material $Ho_2Ti_2O_7$ in a tilted field [Nat. Phys. **3**, 566 (2007)]. We show that this ordering originates from the antiferromagnetic alignment of spin chains on the kagome planes. The residual entropy of the kagome ice is fully recovered. Our result captures the features observed in the experiments and points to the importance of the dipolar interaction in determining ordered states in the spin ice materials. We place our results in the context of recent susceptibility measurements on $Dy_2Ti_2O_7$, showing two features for a [111] field.

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