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Quantum melting of spin ice SHIGEKI ONODA, YOICHI TANAKA, Condensed Matter Theory Laboratory, RIKEN — A quantum melting of the spin ice is proposed for pyrochlore-lattice magnets Pr2TM2O7 (TM =Ir, Zr, and Sn). The quantum pseudospin-1/2 model is derived from the strong-coupling perturbation of the f-p electron transfer in the basis of atomic non-Kramers magnetic doublets. The ground states are characterized by a cooperative ferroquadrupole and pseudospin chirality in the cubic unit cell, forming a magnetic analog of smectic liquid crystals. Then, pinch points observed in spin correlations for dipolar spin-ice systems are replaced with the minima. The relevance to experiments is discussed.

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