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Common features in phase-space networks of frustrated spin models and lattice-gas models FENG WANG, YI PENG, YILONG HAN, Department of Physics, Hong Kong University of Science and Technology, Clear Water Bay, Hong Kong, China, SOFT MATTER AND VIDEO MICROSCOPY LAB TEAM — We mapped the phase spaces of the following four models into networks: (1a) the Ising antiferromagnet on triangular lattice at the ground state and (1b) above the ground state, (2) the six-vertex model (i.e. square ice or spin ice), (3) 1D lattice gas and (4) 2D lattice gas. Their phase-space networks share some common features including the Gaussian degree distribution, the Gaussian spectral density, and the small-world properties. Models 1a, 2 and 3 with long-range correlations in real space exhibit fractal phase spaces, while models 1b and 4 with short-range correlations in real space exhibit non-fractal phase spaces. This result supports one of the untested assumptions in Tsallis's non-extensive statistics.

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