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Who is in charge of the nematic order in iron-based superconductors?

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Although the existence of nematic order in iron-based superconductors is now a well-established experimental fact, its origin remains controversial. Nematic order breaks the discrete lattice rotational symmetry by making the x- and y-directions in the iron plane non-equivalent. This can happen because of a regular structural transition or due to a electronically-driven instability – in particular, orbital order and spin-driven Ising-nematic order. The latter is a magnetic state that breaks rotational symmetry but preserves time-reversal symmetry. Symmetry dictates that the development of one of these orders immediately induces the other two, making the origin of nematicity a physics realization of the "chicken and egg problem." will argue that the evidence strongly points to an electronic mechanism of nematicity, placing nematic order in the class of correlation-driven electronic instabilities, like superconductivity and density-wave transitions. I will discuss different microscopic models for nematicity and link them to the properties of the magnetic and superconducting states, providing a unified perspective on the phase diagram of the iron pnictides. (Based on R.M. Fernandes, A.V. Chubukov, and J. Schmalian, Nature Physics 10, 97 (2014).)