Abstract Submitted
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Nematicity driven by hybridization in the iron-based superconductors[1] VALENTIN STANEV, Materials Science Division, Argonne National Laboratory, Argonne, Illinois 60439, PETER LITTLEWOOD, Physical Sciences and Engineering, Argonne National Laboratory, Argonne, Illinois 60439, USA — We introduce an effective three-orbital model to study the normal state of the iron-based superconductors. It has both itinerant and localized electrons - the former originate from the d_{xz}/d_{yz} iron orbitals, and the latter from the d_{xy} iron orbitals. These distinct degrees of freedom are coupled through hybridization and onsite interactions. On a mean-field level this model has an excitonic instability, driven by the effective delocalization of the d_{xy} electrons. Because of the multiband character of the itinerant Fermi surface the ordered state can spontaneously break the lattice rotation symmetry (and thus is nematic) and generate orbital order. In this scenario the nematic state is induced by the coupling of the d_{xz}/d_{yz} with the d_{xy} iron orbitals, rather than the presence of magnetic order, or the proximity to such. We propose this mechanism as an explanation of the tendency towards nematicity observed in several iron-based compounds, and study some of its experimental consequences.

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