**Theory for the Magnetic Ordering in Fe$_{1+y}$Te$_{1-x}$Se$_x$** CHEN FANG,
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HU, Purdue University — We develop a local spin model to explain the rich mag-
netic structures in the iron-based superconductors $Fe_{1+y}Te_{1-x}Se_x$. We show that
our model exhibits both commensurate antiferromagnetic and incommensurate mag-
netic order along the crystal a-axis, the transition between which can be obtained
by increasing the concentration of the excess $Fe$ to a critical value. The incommen-
surate modulation vector is also shown to be $Fe^2$ concentration dependent. Experi-
mentally measurable spin-wave features and Fermi surface properties are calculated
and compared to those of other Fe-based superconductors. Our model also suggests
the existence of a large quantum critical region due to strong spin frustration upon
increasing $Se$ concentration.

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