

Abstract Submitted  
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**What role does the Fermi surface play in tuning the properties of iron arsenic superconductors?**<sup>1</sup> R.S. DHAKA, CHANG LIU, R.M. FERNANDES, RUI JIANG, T. KONDO, A. THALER, J. SCHMALIAN, S.L. BUD'KO, P.C. CANFIELD, ADAM KAMINSKI, Ames Laboratory and Department of Physics and Astronomy, Iowa State University, Ames, Iowa 50011, USA — External control parameters such as pressure or chemical substitution are the key to extend the phase space and achieve high temperature ( $T_c$ ) superconductivity in the FeAs family. These materials show interesting properties where it is important to understand the role of Fermi surfaces (FS's) in the mechanism of yielding higher  $T_c$ . Here, we use angle-resolved photoemission to study the electronic structure of the  $\text{Ba}(\text{Fe}_{1-x}\text{Ru}_x)_2\text{As}_2$  as a function of Ru concentration ( $x$ ). We find that the substitution of Ru for Fe is isoelectronic, i. e., it does not change the value of the chemical potential. More interestingly, there are no measured significant changes in the shape of the FS or in the Fermi velocity over a wide range [1]. We contrast this unusual behavior with the Co substitution, where even small substitutions induce large changes not only in the size of the FS pockets but also in the FS topology [2]. Given that the suppression of the antiferromagnetic and structural phase has been associated with the emergence of the superconducting state, Ru substitution must achieve this via a mechanism that does not involve changes of the Fermi surface. We speculate that this mechanism relies on magnetic dilution that leads to the reduction of the effective Stoner enhancement.

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[1] R. S. Dhaka, *et al.*, PRL (2011).

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[2] Chang Liu, *et al.*, Nature Physics, **6**, 419 (2010).

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