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The effects of Coulomb interactions on the superconducting gaps in iron-based superconductors[1] ZHIDONG LEONG, PHILIP PHILLIPS, University of Illinois at Urbana-Champaign — Recent ARPES measurements on Co-doped LiFeAs report a large and robust superconducting gap on a band below the chemical potential. We will show that, unlike a conventional BCS theory, a multi-band system with strong interband Coulomb interactions can explain the observations. We use a two-band model consisting of a superconducting electron band and a hole band that is below the chemical potential. The two bands are coupled via interband Coulomb interactions. Using Eliashberg theory, we found that superconductivity in the electron band induces a large superconducting gap in the hole band. Furthermore, the repulsive nature of the Coulomb interactions gives the induced gap an opposite sign, corresponding to an $s_{\pm}$ gap symmetry. Unlike other families of iron pnictides, the gap symmetry of LiFeAs has not been ascertained experimentally. The implications for the superconducting mechanism in iron pnictides will be discussed.

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