

Abstract Submitted  
for the MAR17 Meeting of  
The American Physical Society

**Infrared probe of the superconducting gap across the phase diagram of  $\text{Ba}_{1-x}\text{K}_x\text{Fe}_2\text{As}_2$**  R.P.S.M. LOBO, ESPCI Paris, CNRS, UPMC  
— We measured the optical conductivity of superconducting single crystals of  $\text{Ba}_{1-x}\text{K}_x\text{Fe}_2\text{As}_2$  with  $x$  ranging from 0.40 (optimal doping,  $T_c = 39$  K) down to 0.20 (underdoped,  $T_c = 16$  K) where a magnetic order coexists with superconductivity. In the superconducting state, the formation of the superconducting condensate leads to a low-frequency suppression of the optical conductivity spectral weight. In the coexistence region, the superfluid density is significantly suppressed, and the weight of unpaired carriers rapidly increases. Whereas the gap is isotropic near the optimally doped region, a significant residual conductivity appears in the underdoped regime. We attribute these results to anisotropic changes in the superconducting gap due to the strong interplay between magnetism and superconductivity in underdoped  $\text{Ba}_{1-x}\text{K}_x\text{Fe}_2\text{As}_2$ .

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Date submitted: 12 Nov 2016

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