

Abstract Submitted  
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**Majorana zero modes in  $p + ip$  superconducting rings with half quantum flux in the presence of a  $d$ -soliton**<sup>1</sup> ALI BEYRAMZADEH MOGHADAM, KIRILL SHTENGEL , University of California - Riverside — Half-integer flux quantization has been observed in mesoscopic rings of superconducting  $Sr_2RuO_4$ <sup>2</sup>. This finding suggests a chiral  $p + ip$  nature of the superconducting order parameter. Under the assumption that the  $d$ -vector (which parametrizes the triplet pairing) lies in the plane of a 2D superconductor, such rings are expected to support Majorana zero modes at their inner and outer edges. However, such modes have not been directly observed in experiments. More recently, H.-Y. Kee and M. Sigrist argued that the spin-orbit coupling in such systems can stabilize a different spin texture, also consistent with half-quantum vortices<sup>3</sup>. That spin texture is characterized by the presence of a so-called  $d$ -soliton—a radial domain wall between the regions where the  $d$ -vector is oriented in the positive and negative  $z$ -directions. Our theoretical investigation of superconducting rings with  $d$ -solitons confirms the existence of two Majorana zero modes, one at each boundary. Furthermore, the presence of a  $d$ -soliton enhances the hybridization between the localized Majorana modes at the inner and outer boundaries.

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<sup>2</sup>J. Jang et al. Science **331**, 186 (2011)

<sup>3</sup>H.-Y. Kee, M. Sigrist, arXiv:1307.5859

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