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Cryomagnetic STM spectroscopy study of multiband pairing in layered superconductors[1] IGOR FRIDMAN, University of Toronto, VLADIMIR LUKIC, Stevens Institute of Technology, CHRISTIAN KLOC, Nanyang Technological University, Singapore, CEDOMIR PETROVIC, Brookhaven National Laboratory, PENGCHENG DAI, University of Tennessee in Knoxville, J.Y.T. WEI, University of Toronto and Canadian Institute for Advanced Research — Cooper pairing in layered superconductors can involve multiple bands and give rise to complex gap structures in momentum space. Using scanning tunneling microscopy (STM) with a magnetic field applied parallel to the *ab*-plane, we investigate multiband pairing under diamagnetically-induced superfluid momentum. STM spectroscopy and conductance imaging were performed down to 300 mK and up to 9 T, on single-crystals of the Nb-chalcogenide $2H$-$NbSe_2$ and the Fe-pnictides LiFeAs and electron-doped $BaFe_2As_2$. Spectroscopy data taken on $2H$-$NbSe_2$ at 300 mK showed a distinctly two-sloped field evolution of the zero-bias conductance, consistent with Doppler-induced depairing on parts of the Fermi surface [1]. Spatial conductance maps revealed stripe patterns that originate from in-plane vortices whose cores are buried in the bulk [2] and which undergo a transition as pairing on one of the bands is suppressed. Our results demonstrate a general method for probing multiband superconductors, especially ones whose band structures host coexisting orders and also play a direct role in the pairing mechanism.

[1] I. Fridman *et al.*, arXiv:1110.6490 (2011)
[2] I. Fridman *et al.*, Appl. Phys. Lett. **99**, 192505 (2011)

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Igor Fridman
University of Toronto

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