

Lecture 10:

Topological superconductivity

(Kitaev model, Majorana fermions, signatures)

zero-bias anomaly in nanowire

Signatures of Majorana Fermions in Hybrid Superconductor-Semiconductor Nanowire Devices

V. Mourik,^{1*} K. Zuo,^{1*} S. M. Frolov,¹ S. R. Plissard,² E. P. A. M. Bakkers,^{1,2} L. P. Kouwenhoven^{1†}

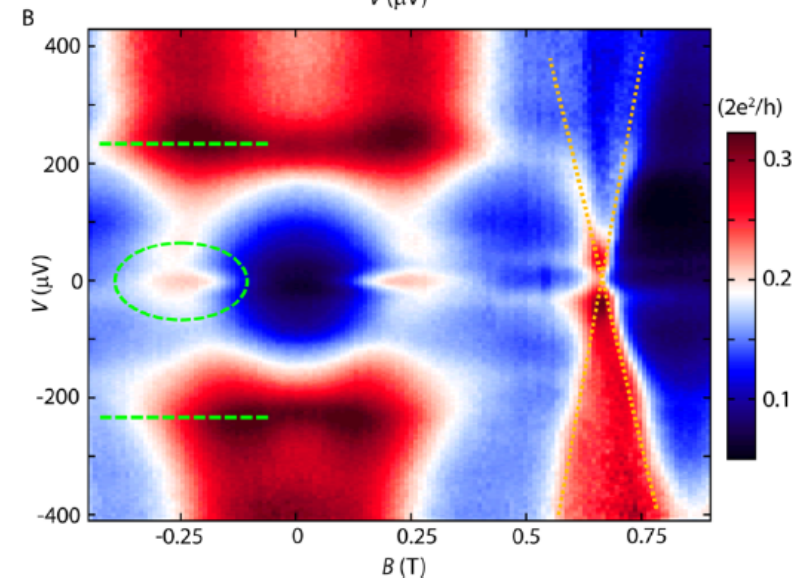
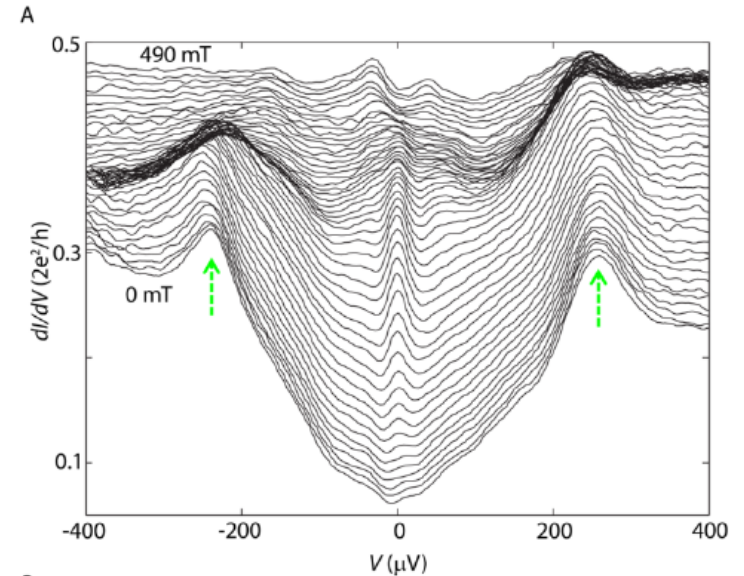
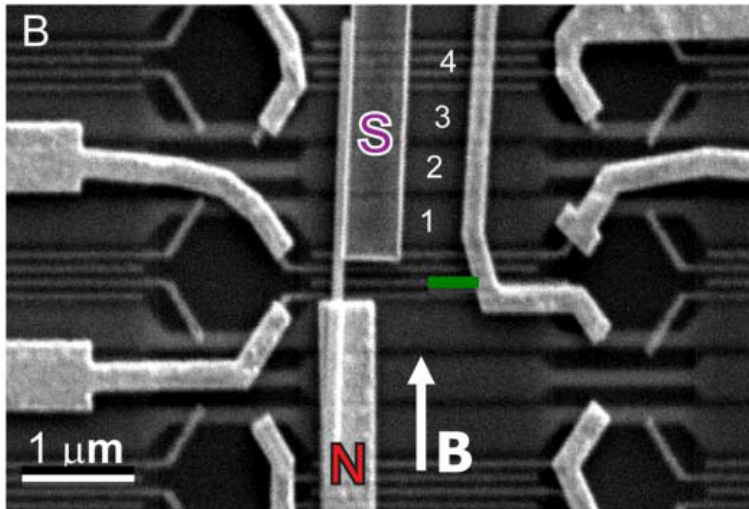
¹Kavli Institute of Nanoscience, Delft University of Technology, 2600 GA Delft, Netherlands.

²Department of Applied Physics, Eindhoven University of Technology, 5600 MB Eindhoven, Netherlands.

*These authors contributed equally to this work.

†To whom correspondence should be addressed. E-mail: l.p.kouwenhoven@tudelft.nl

Science 336, 1003 (2012)



zero-bias anomaly in chain of magnetic atoms

Observation of Majorana fermions in ferromagnetic atomic chains on a superconductor

Stevan Nadj-Perge,^{1*} Ilya K. Drozdov,^{1*} Jian Li,^{1*} Hua Chen,^{2*} Sangjun Jeon,¹ Jungpil Seo,¹ Allan H. MacDonald,² B. Andrei Bernevig,¹ Ali Yazdani

Science 346, 602 (2014)

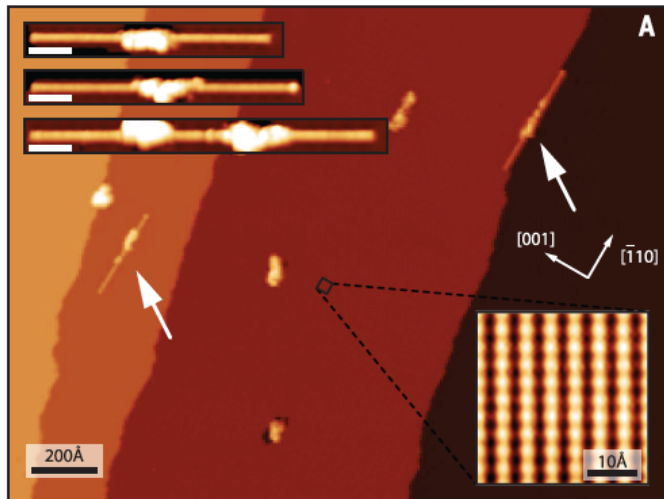
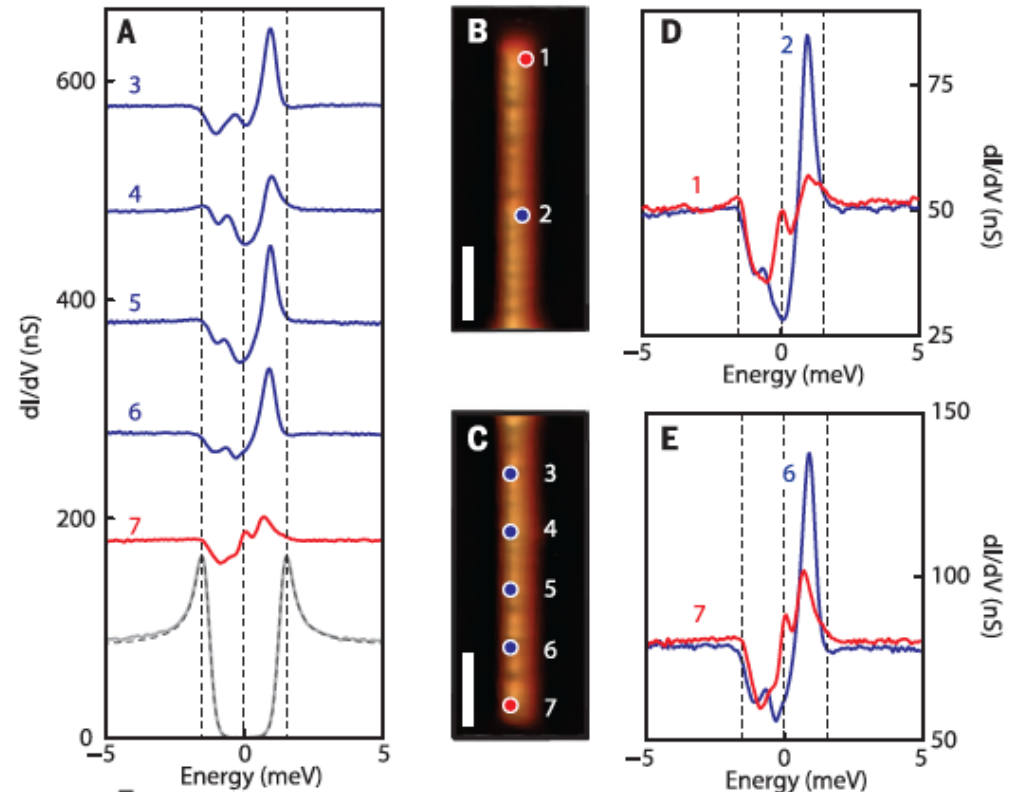


Fig. 2. Atomic Fe chains on Pb(110). (A) Topograph of the Pb(110)

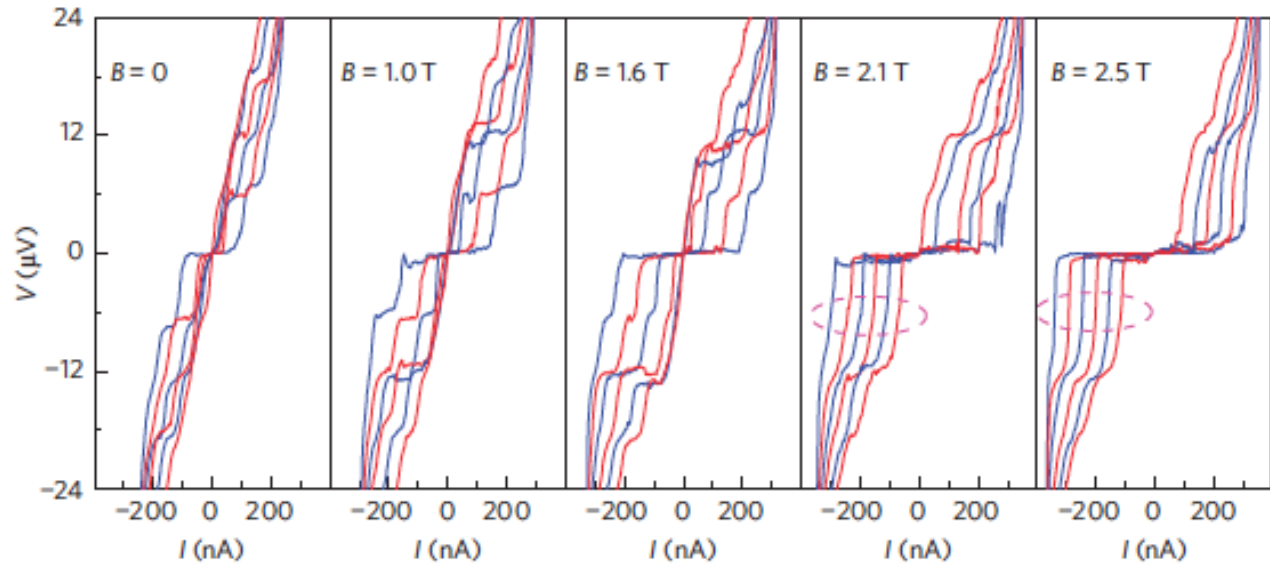
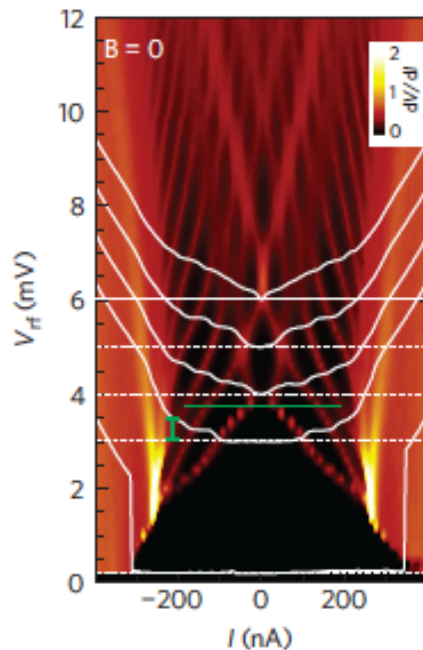
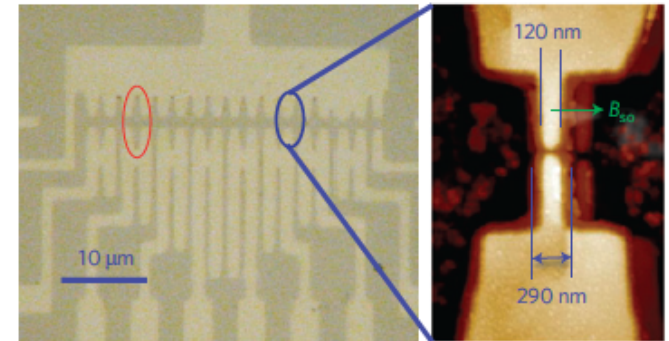


disappearance of first Shapiro steps

The fractional a.c. Josephson effect in a semiconductor-superconductor nanowire as a signature of Majorana particles

Leonid P. Rokhinson^{1*}, Xinyu Liu² and Jacek K. Furdyna²

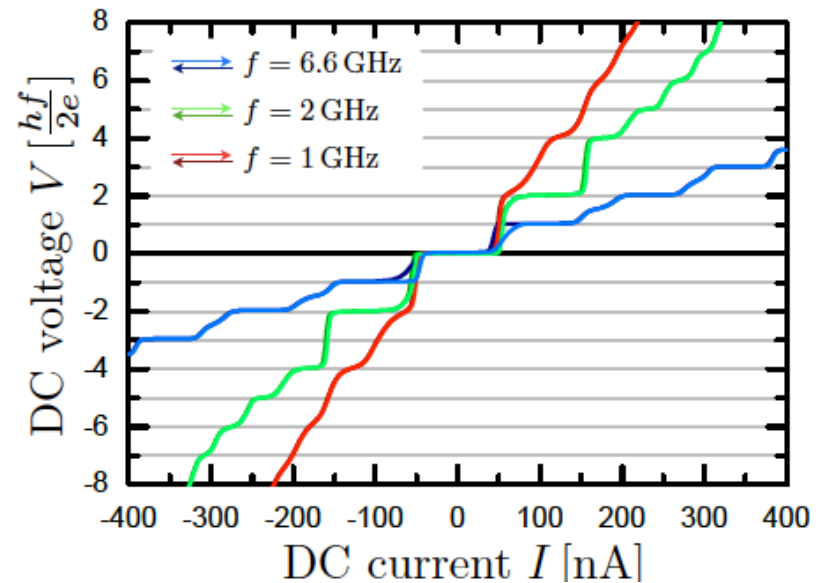
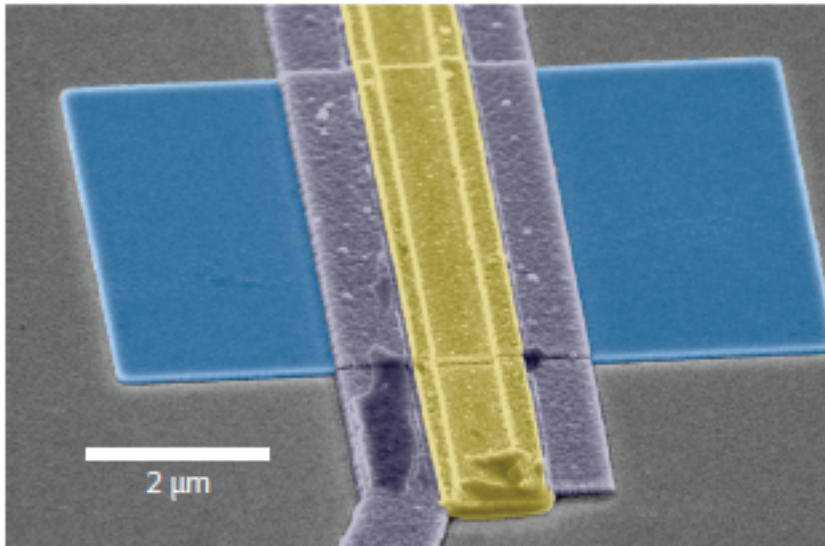
Nature Phys. 8, 795 (2012).



disappearance of even Shapiro steps

Gapless Andreev bound states in the quantum spin Hall insulator HgTe

Erwann Bocquillon^{1*†}, Russell S. Deacon^{2,3†}, Jonas Wiedenmann^{1†}, Philipp Leubner¹,
Teunis M. Klapwijk⁴, Christoph Brüne¹, Koji Ishibashi^{2,3}, Hartmut Buhmann¹
and Laurens W. Molenkamp¹

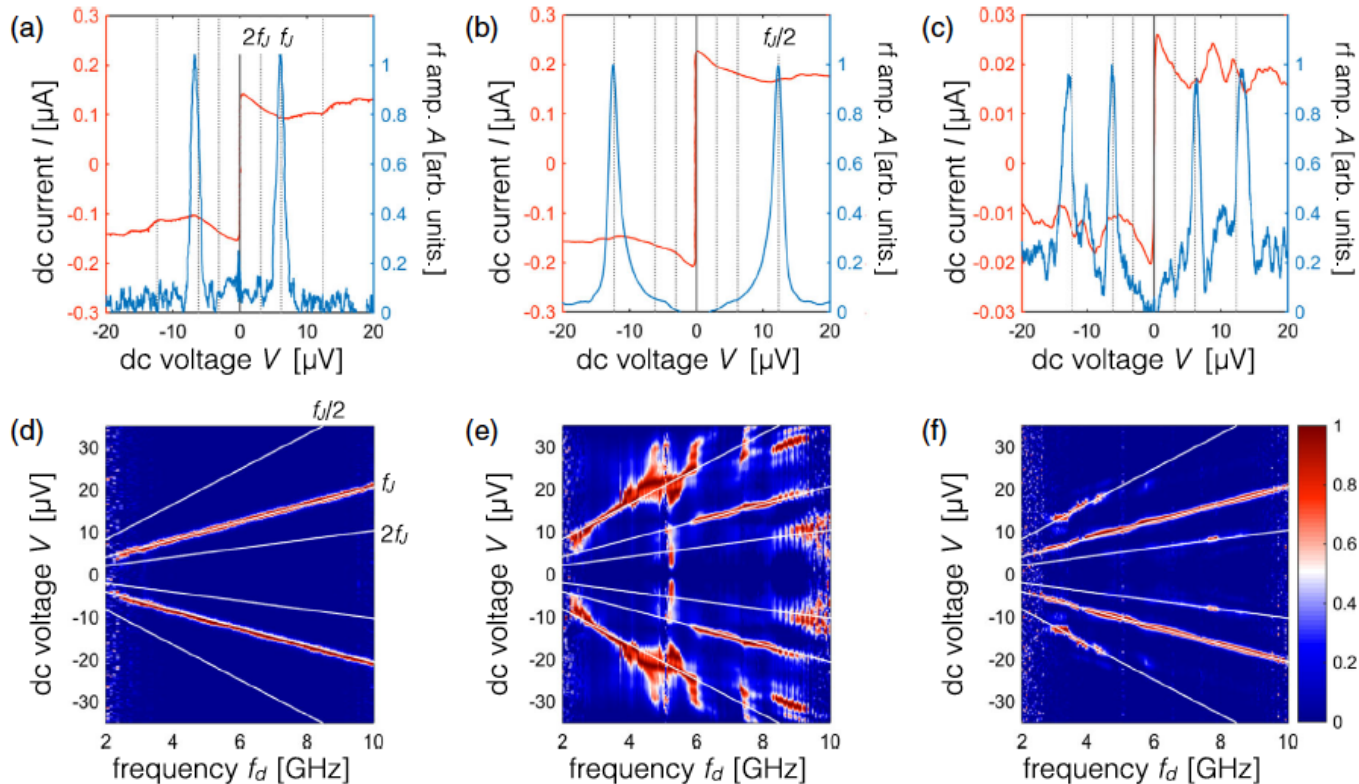
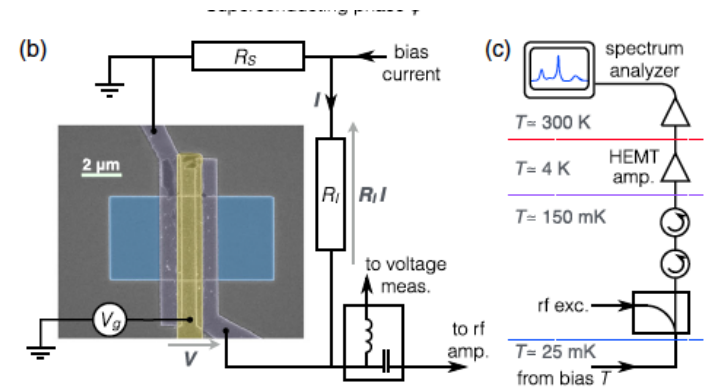


fractional Josephson radiation

PHYSICAL REVIEW X 7, 021011 (2017)

Josephson Radiation from Gapless Andreev Bound States in HgTe-Based Topological Junctions

R. S. Deacon,^{1,2} J. Wiedenmann,³ E. Bocquillon,^{3,*} F. Domínguez,⁴ T. M. Klapwijk,⁵ P. Leubner,³ C. Brüne,³
E. M. Hankiewicz,⁴ S. Tarucha,^{2,6} K. Ishibashi,^{1,2} H. Buhmann,³ and L. W. Molenkamp³



« Majorana box »

206 | NATURE | VOL 531 | 10 MARCH 2016

Exponential protection of zero modes in Majorana islands

S. M. Albrecht^{1*}, A. P. Higginbotham^{1,2*}, M. Madsen¹, F. Kuemmeth¹, T. S. Jespersen¹, J. Nygård¹, P. Krogstrup¹ & C. M. Marcus¹

