



Call 2017

SuperTop

Topologically protected states in double
nanowire Superconductor Hybrids

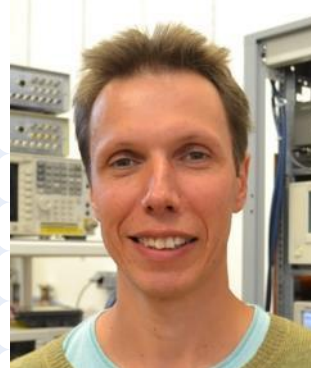
Szabolcs Csonka

dept.physics.bme.hu/Supertop

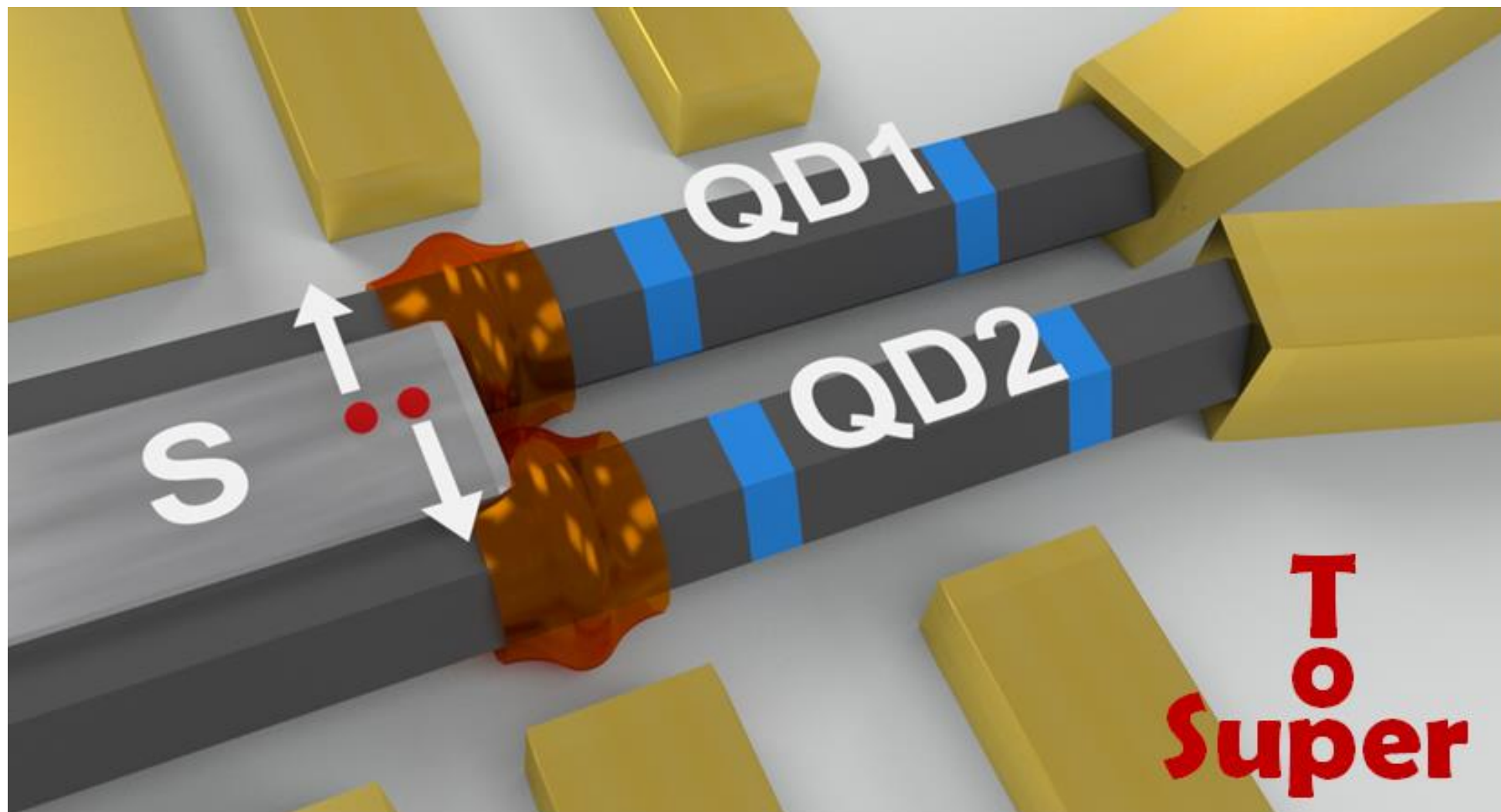


SuperTop Team

<i>Partner Number/ Acronym</i>	<i>Country</i>	<i>Institution/ Department</i>	<i>Name of the Principal Investigator (PI)³</i>
1 <i>Coordinat.</i> BME	HU	Budapest University of Technology & E.	Prof. Dr. Szabolcs Csonka
2 UBAS	CH	University of Basel	Prof. Dr. Christian Schönenberger
3 UCPH	DK	University of Copenhagen	Prof. Dr. Jesper Nygard
4 TU Delft	NL	Delft University of Technology	Dr. Attila Geresdi
5 CNRS	F	Ecole Normale Supérieure Paris	Prof. Dr. Takis Kontos
6 CNR Nano	I	Istituto Nanoscienze-CNR	Prof. Dr. Lucia Sorba



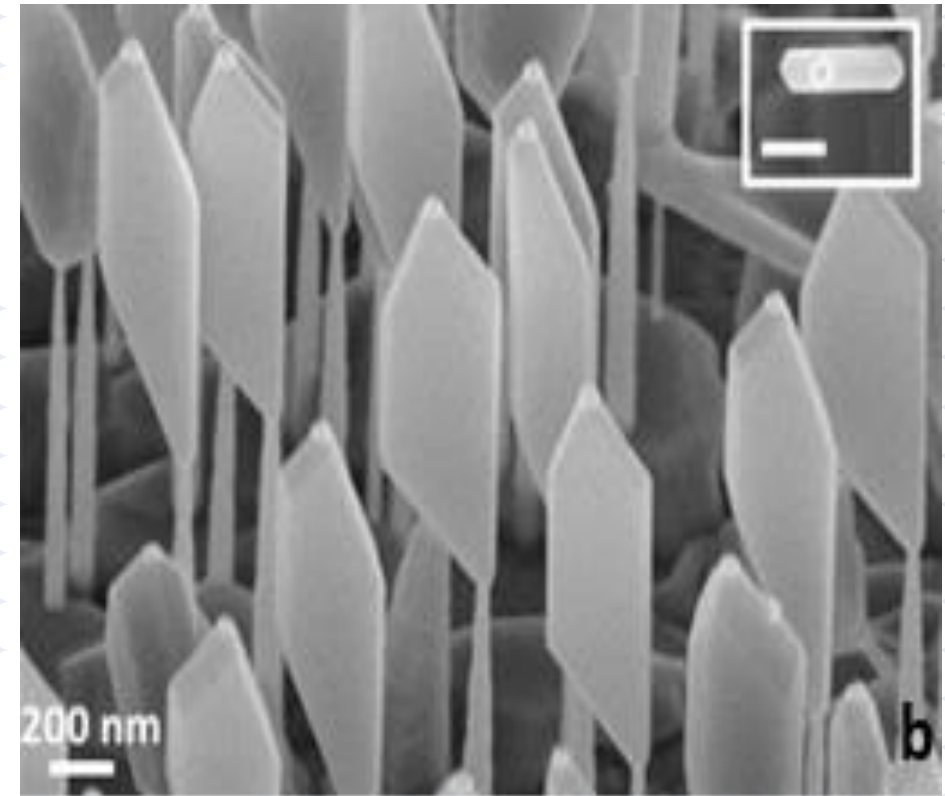
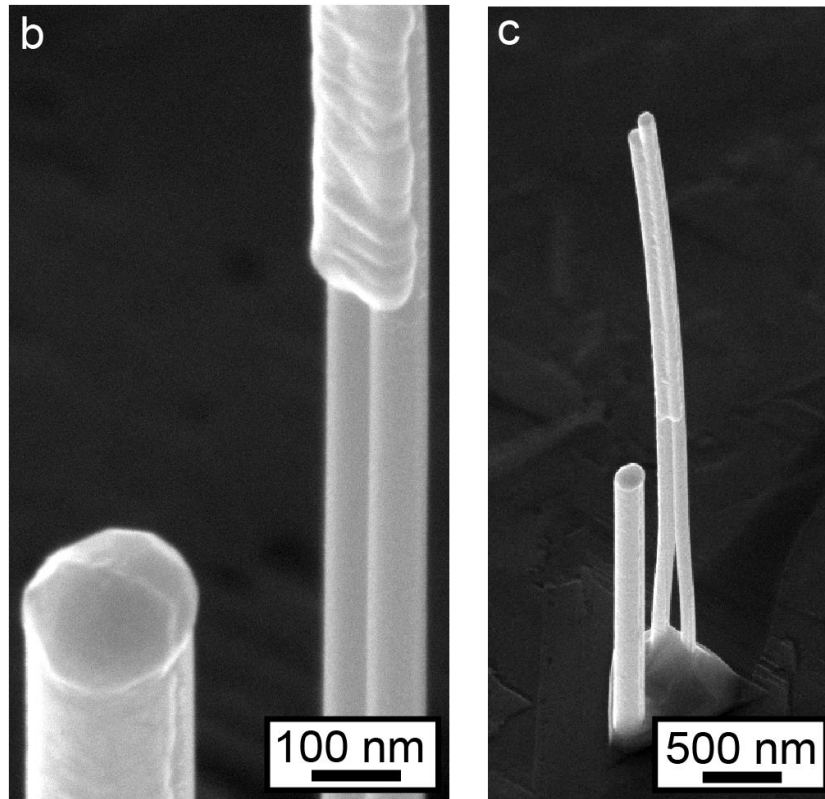
SuperTop



Novel hybrid nanostructures

 Strong SC coupling →

 Novel nanowire platform

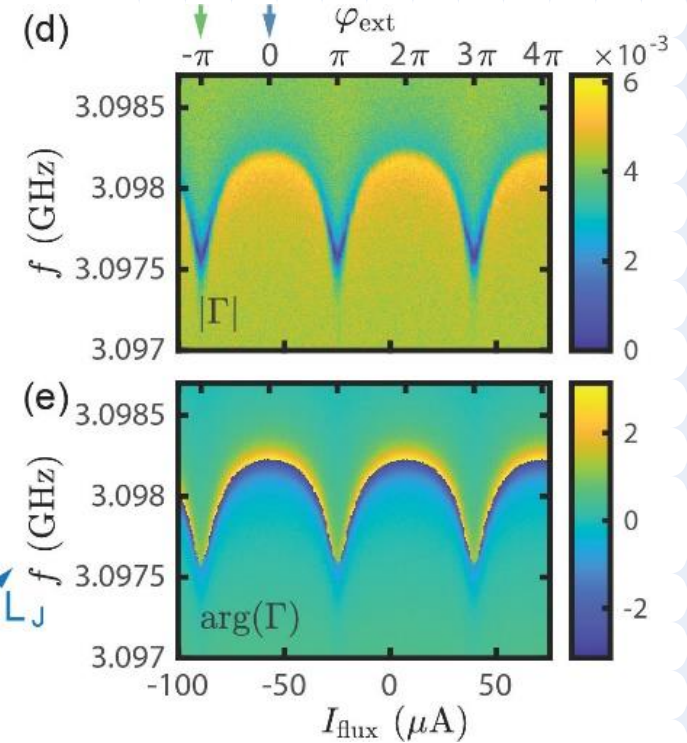
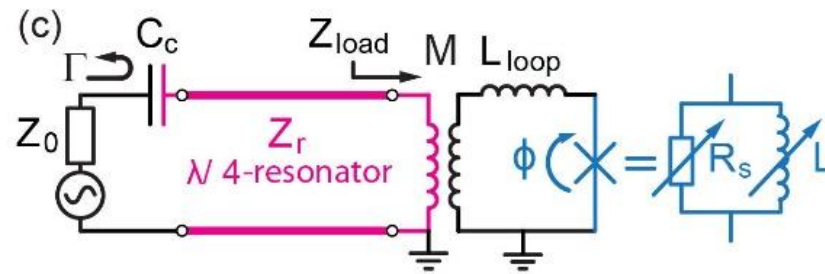
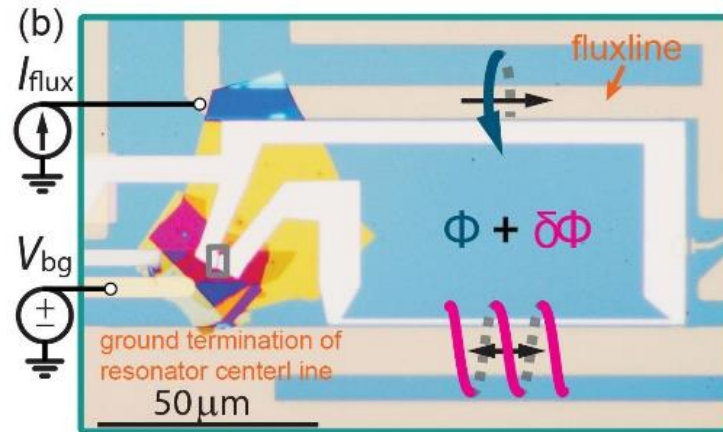


T. Kanne et al., Adv. Funct. Mater. 32, 2107926 (2022).

I. Verma et al., Nanomaterials (7); 1090 (2022)

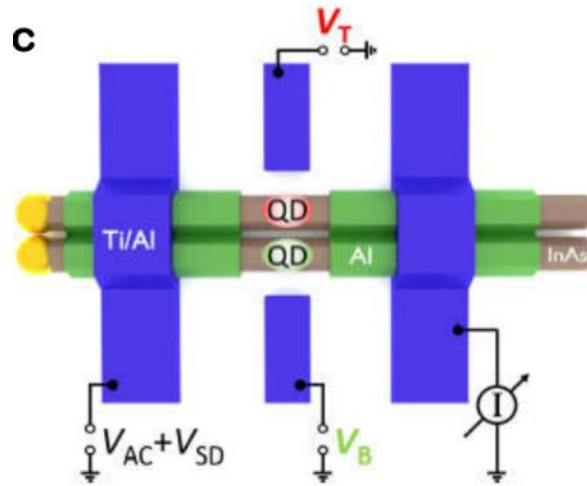
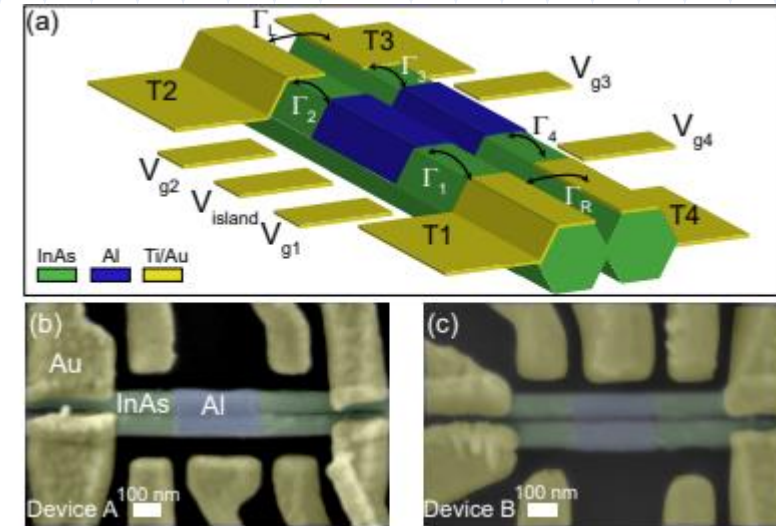
Developed techniques

CPR by RF reflectance measurements to explore ground state properties



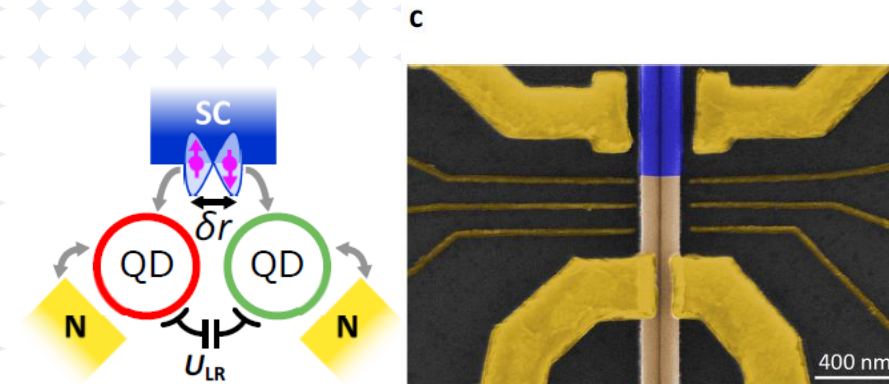
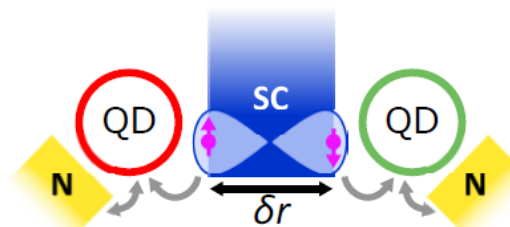
DNW quantum devices

 DNW island device



 Cooper pair splitters

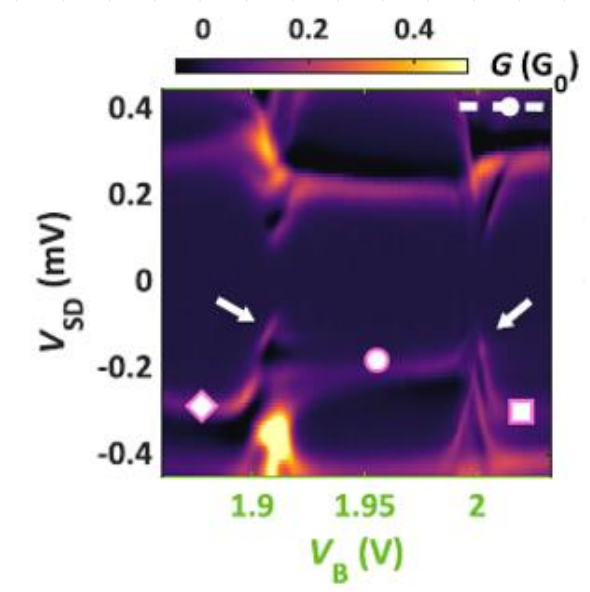
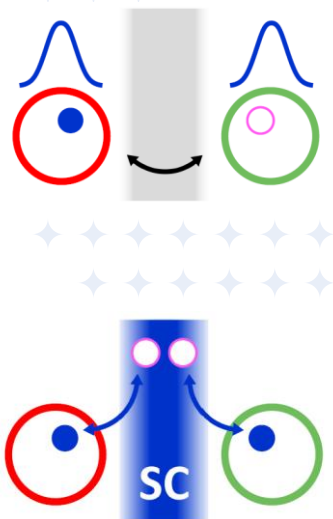
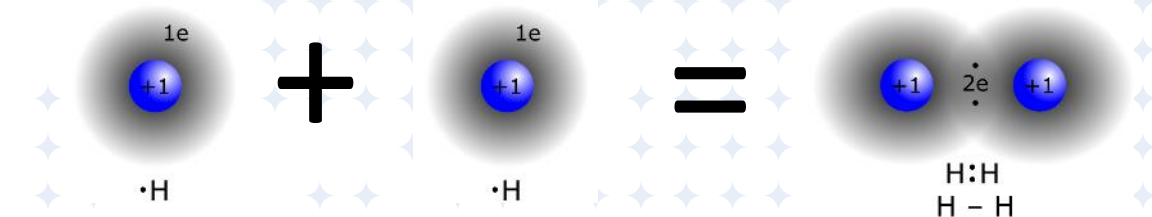
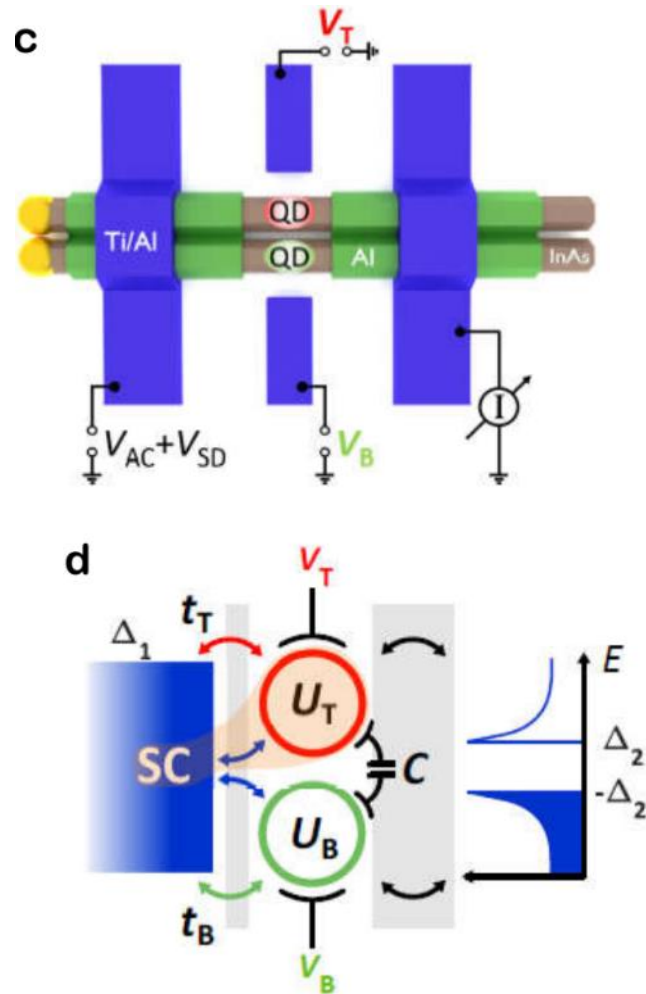
 Andreev molecule



O. Kürtössy et al., *Nano Letters*, 21, 7929 (2021),
Z. Scherübl et al. *Nature Communications* 11, 1834 (2020).

A. Vekris et al., *Nano Letters*, 22, 5765 (2022),
O. Kürtössy et al., *Nature pj Quantum Materials*, accepted (2022).

Andreev molecule



O. Kürtössy et al., *Nano Letters*, 21, 7929 (2021),
 Z. Scherübl et al. *Nature Communications* 11, 1834 (2020).

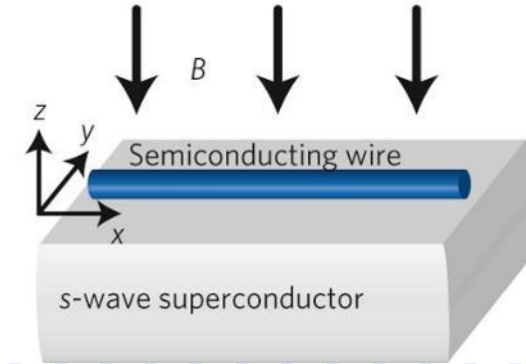
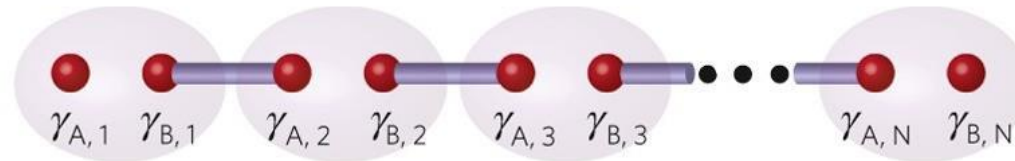


Efficient SC coupling between Dots

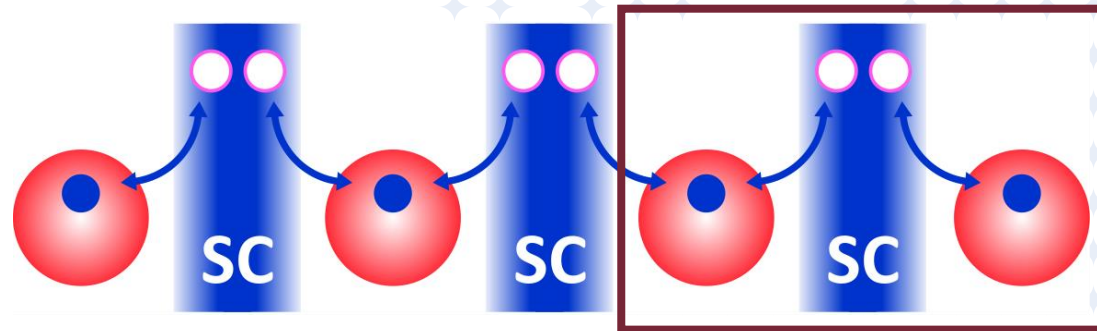
Towards Topological Qubits



Kitaev model



Kitaev chain from quantum dots



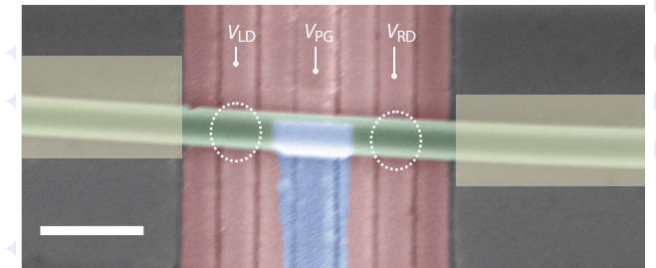
J Alicea et al., Nature Phys. 7, 412, (2011).

J.D. Sau et al, Nature Com. 3, 964 (2012).



Realization of a minimal Kitaev chain
in coupled QDots

T Dvir et al., arXiv [arXiv:2206.08045](https://arxiv.org/abs/2206.08045) (2022).



IMPACT (RRI aspects)



PUBLICATIONS are available (open access/arXiv)

Total: 64

8: Science, Nature Phys, Nature Com. , Adv. Func. Material

10: NanoLetters, PRL, Npj Com. Phys.

23: PRB, PRA, PRR, Sci. Com.

STRONG NETWORKING (besides Covid): ~240days of researcher exchange



SCIENCE EDUCATION: Researcher nights, Science Camp, videos (Covid), Spring and summer schools, ...



PUBLIC ENGAGEMENT: Quantumotion art and Science project. The Soul Soldiers. Concepts such as quantization of motion, tunneling or entanglement have been "danced" on stage through hip hop and contemporary moves.



END USERS: Quantum scientists



QUANTERA

ERA-NET Cofund in Quantum Technologies



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