Quantized Conductance of Majorana Zero Mode in the Vortex core of $(Li_{0.84}Fe_{0.16})OHFeSe$

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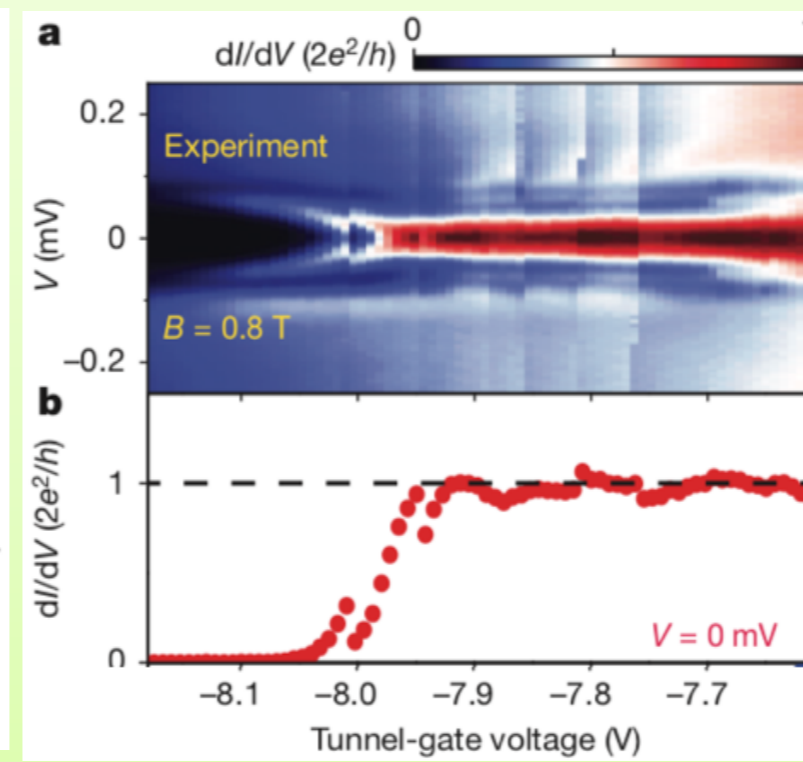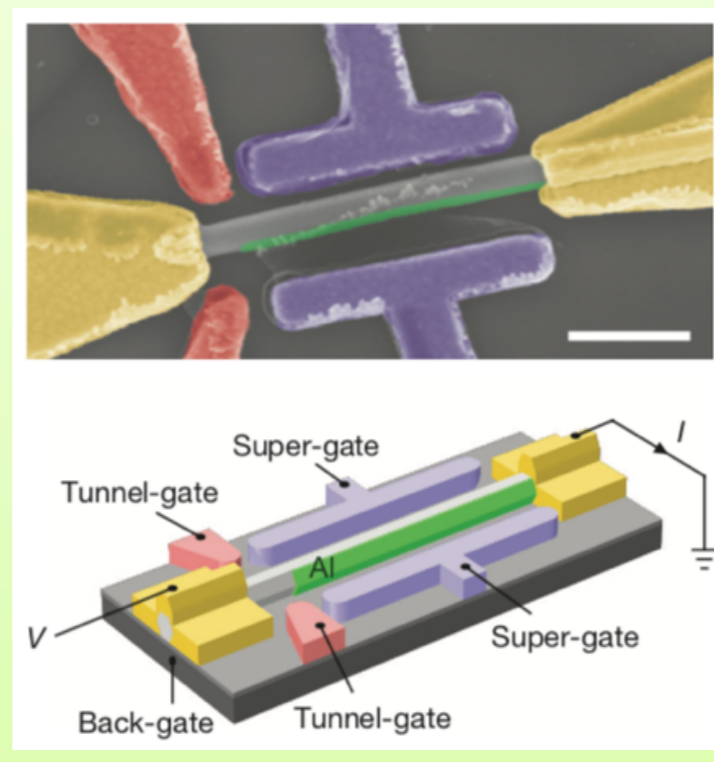
I. Majorana zero mode in topological superconductor
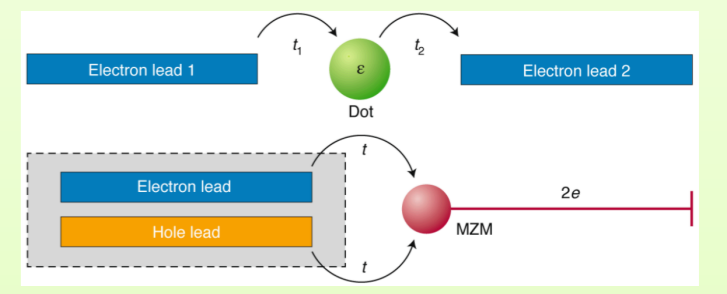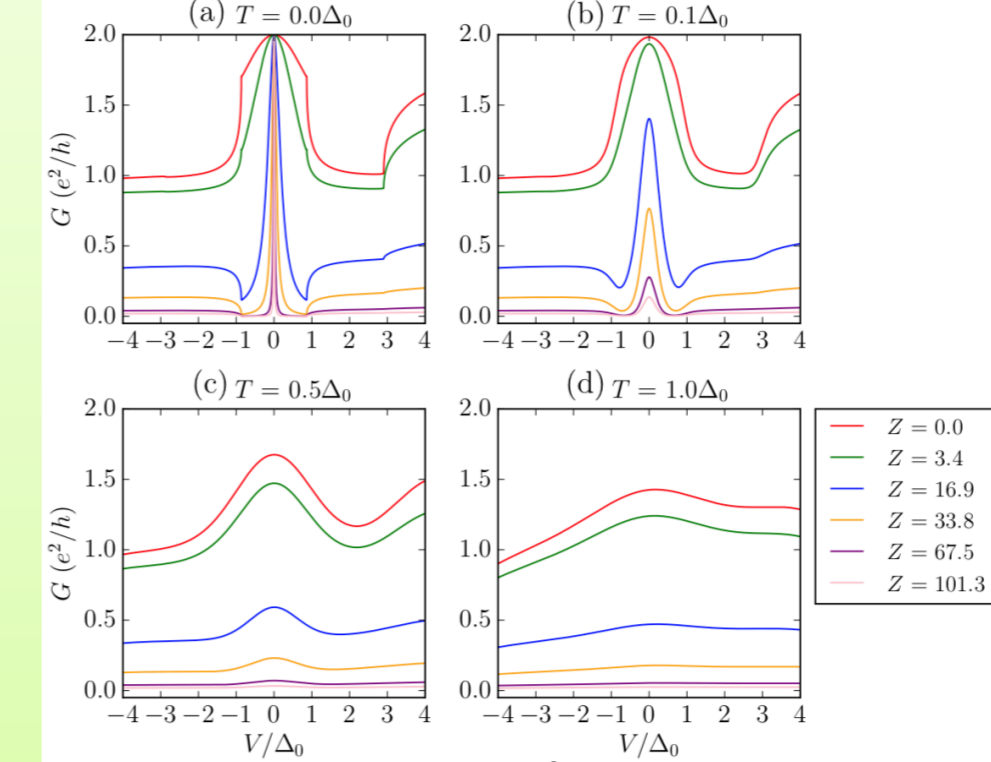
$Li_{0.84}Fe_{0.16}OHFeSe$
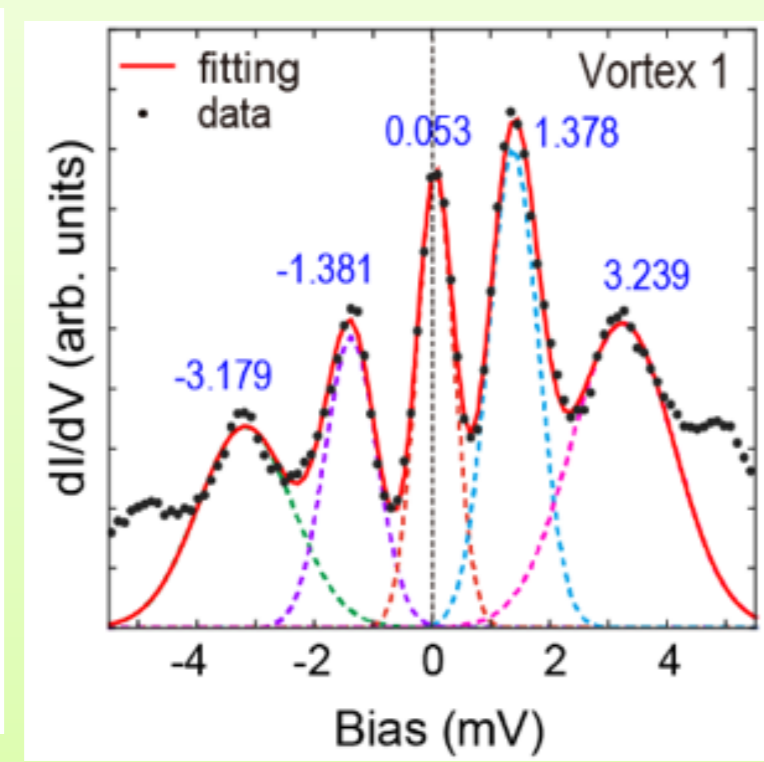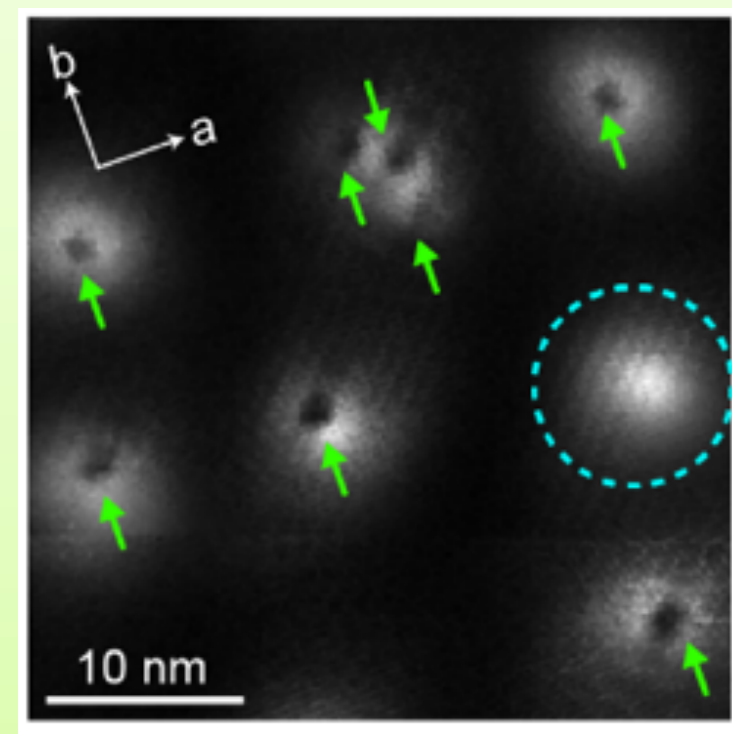
Q. Liu et al, PRX 8, 041056 (2018)

One-dimensional nanowire

H. Zhang et al, Nature (2018).
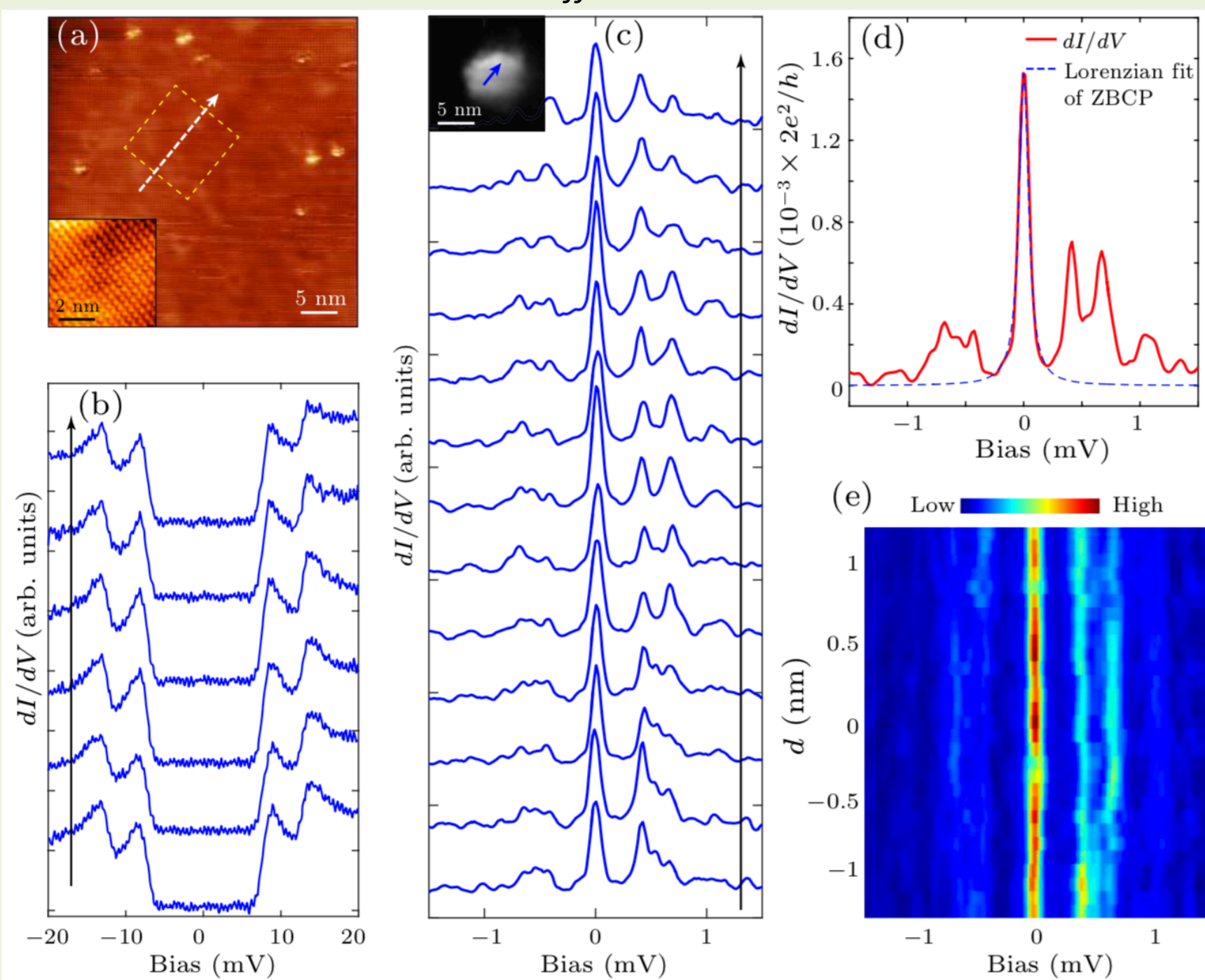
Majorana induced resonant Andree Reflection

For $t_1 = t_2$ (T=0K)

The conductance is quantized $G = 2e^2/h$

M. Franzet al, Nature Physics 14, 334–336 (2018)
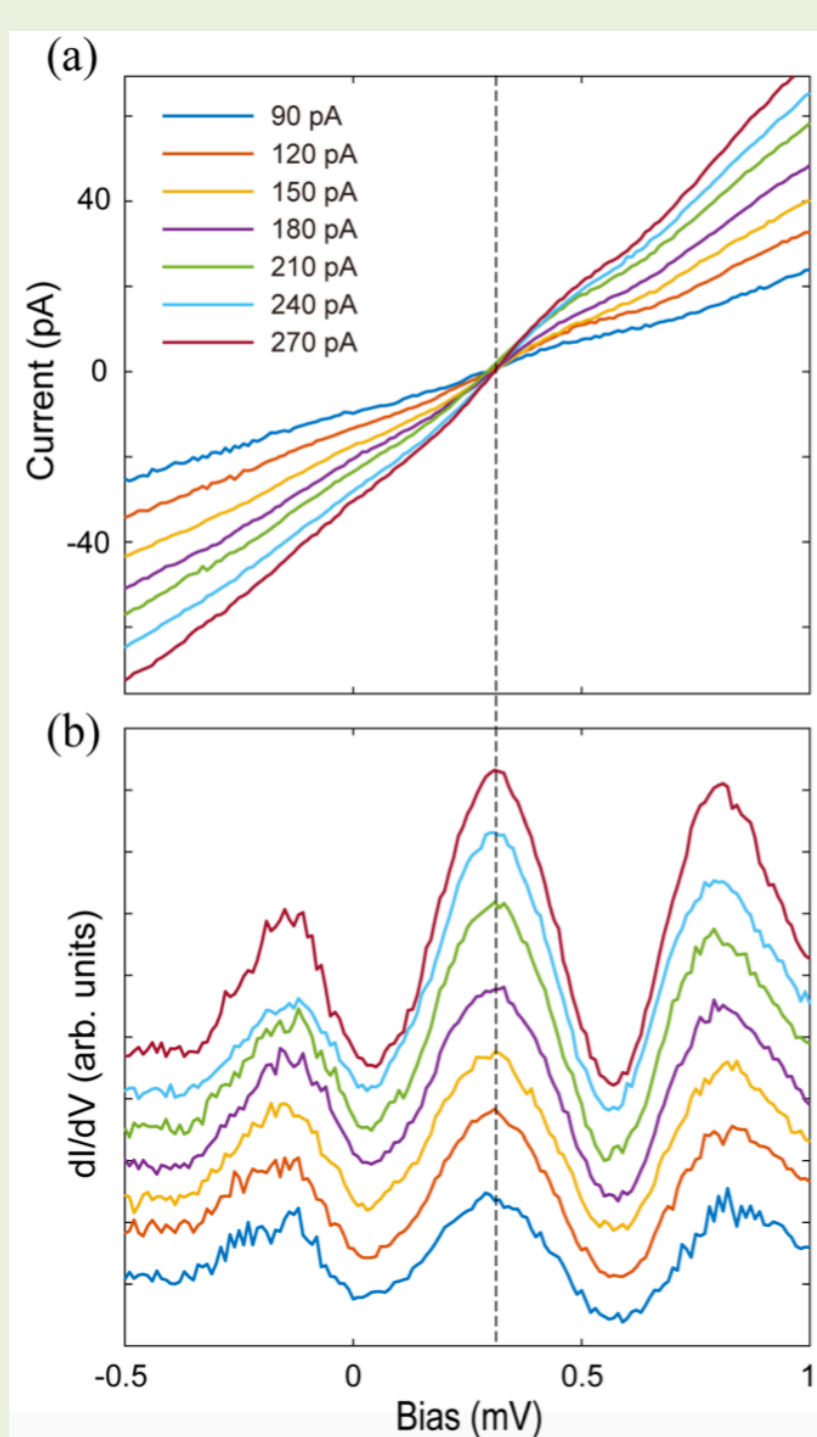F. Setiawan et al, Phys. Rev. B 96, 184520 (2017)

II. Quantized Conductance of Majorana zero mode
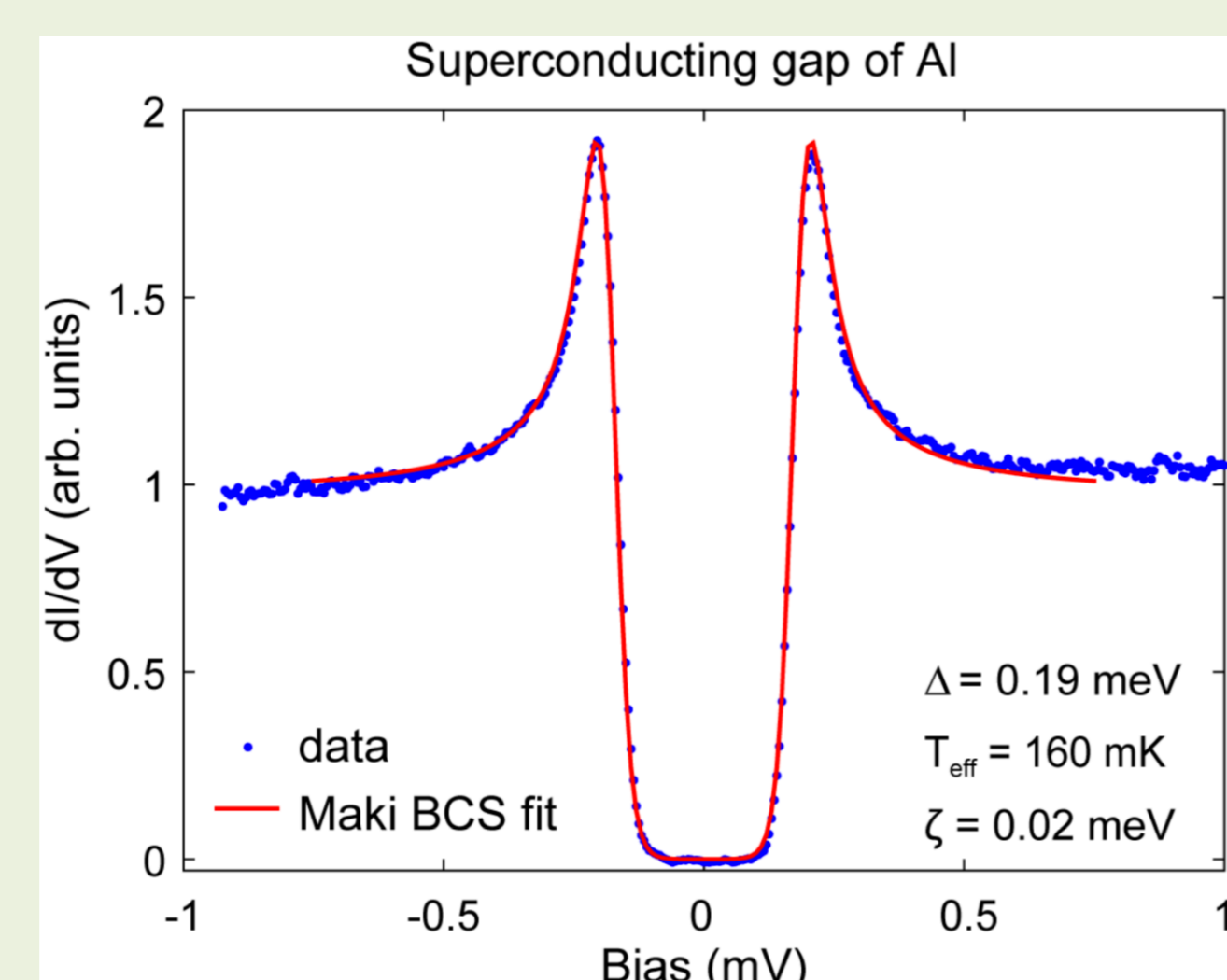
High energy resolution of MZM

We measure the MZM in the vortex core of $(Li_{0.84}Fe_{0.16})OHFeSe$ with high energy resolution at $T_{eff}=160mK$.

STS spectra at different tunneling transmission

We gradually reduce the distance between the STM tip and the sample surface to enhance the tunneling transmission.
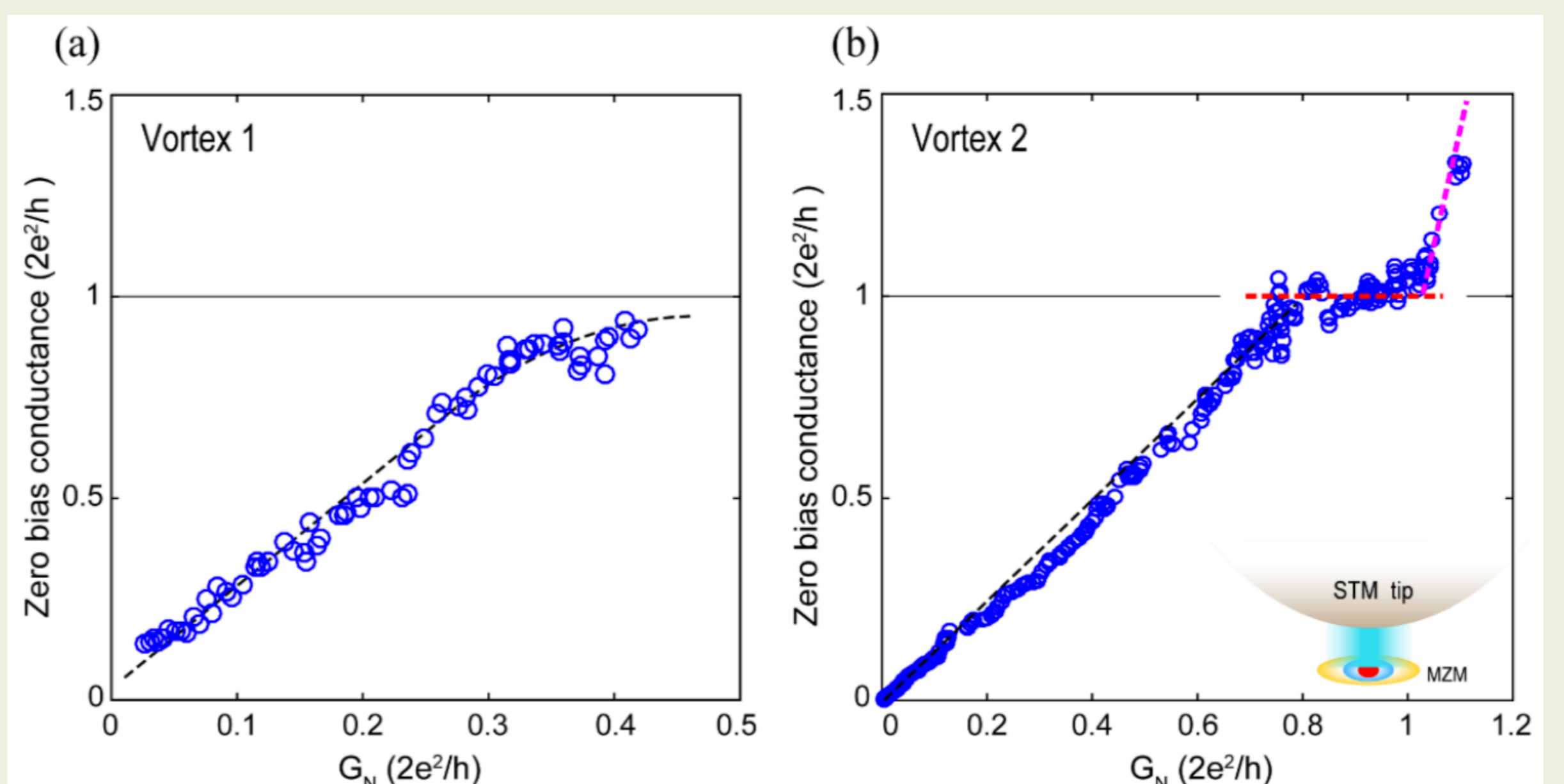
Calibration of the dilution-STM system

We calibrate the effective electron temperature and zero-bias offset of our dilution refrigerator STM.

Superconducting gap of Al

$\Delta = 0.19$ meV
$T_{eff} = 160$ mK
$\zeta = 0.02$ meV

- data
- Maki BCS fit
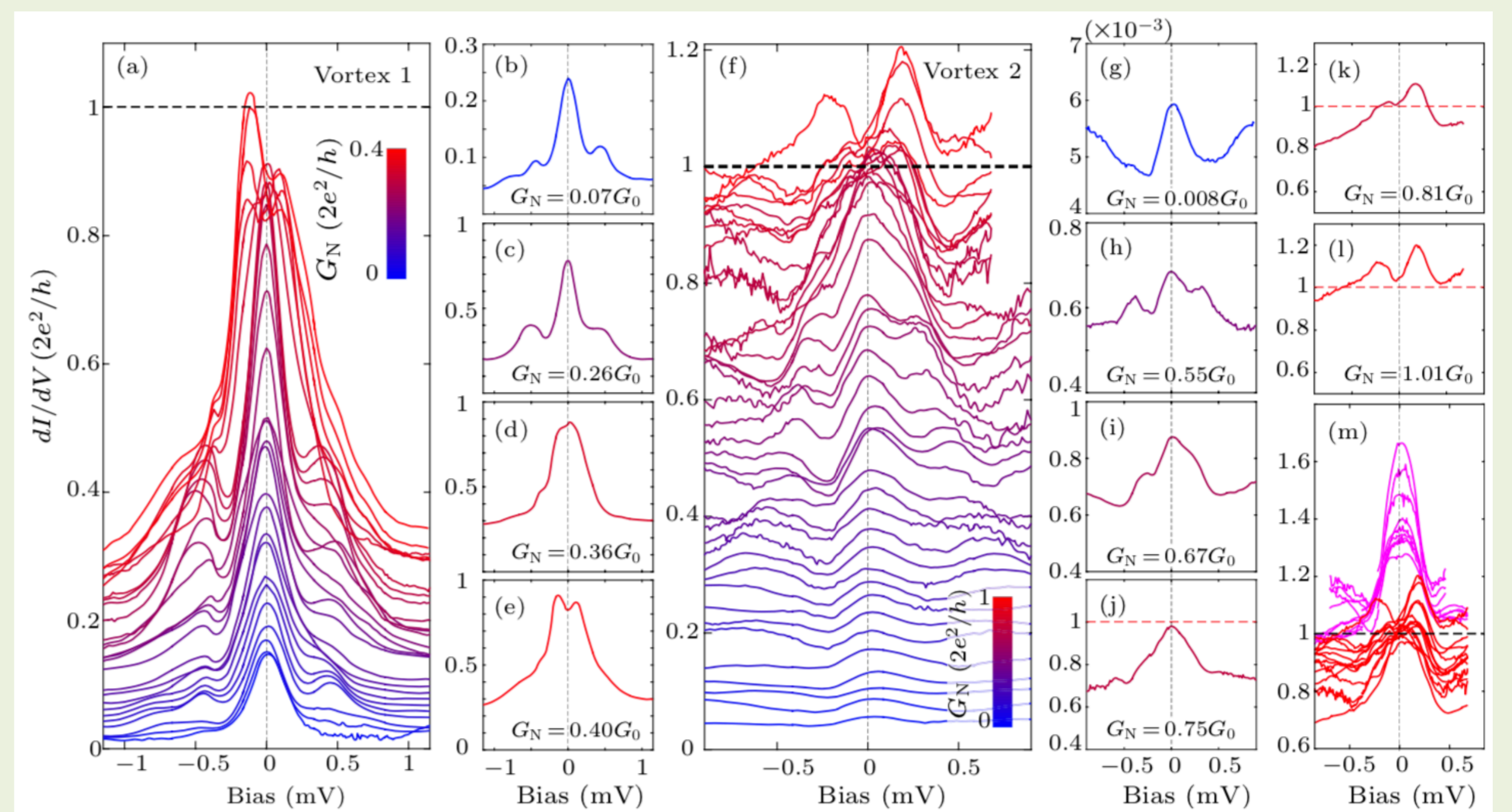
Conductance plateau at $2e^2/h$

We observe the quantized conductance palteau of MZM in the Vortex core of $(Li_{0.84}Fe_{0.16})OHFeSe$.

III. Conclusion

Here using scanning tunneling spectroscopy, we observed the clean and robust MZM in the cores of free vortices in $(Li_{0.84}Fe_{0.16})OHFeSe$. Furthermore, we demonstrate that Majorana-induced resonant Andreev reflection occurs between the STM tip and this zero-bias bound state, and consequently, the conductance at zero bias is quantized as $2e^2/h$.

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