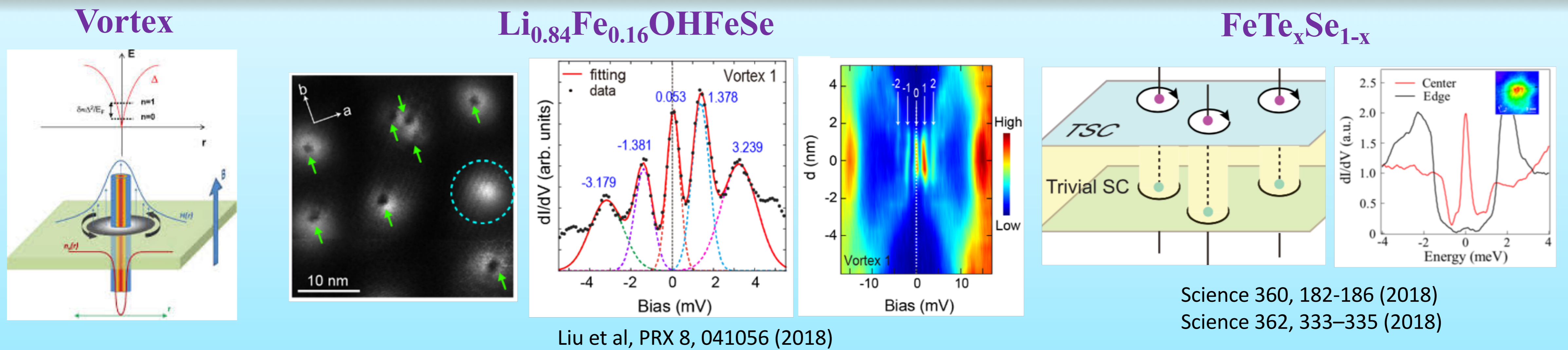
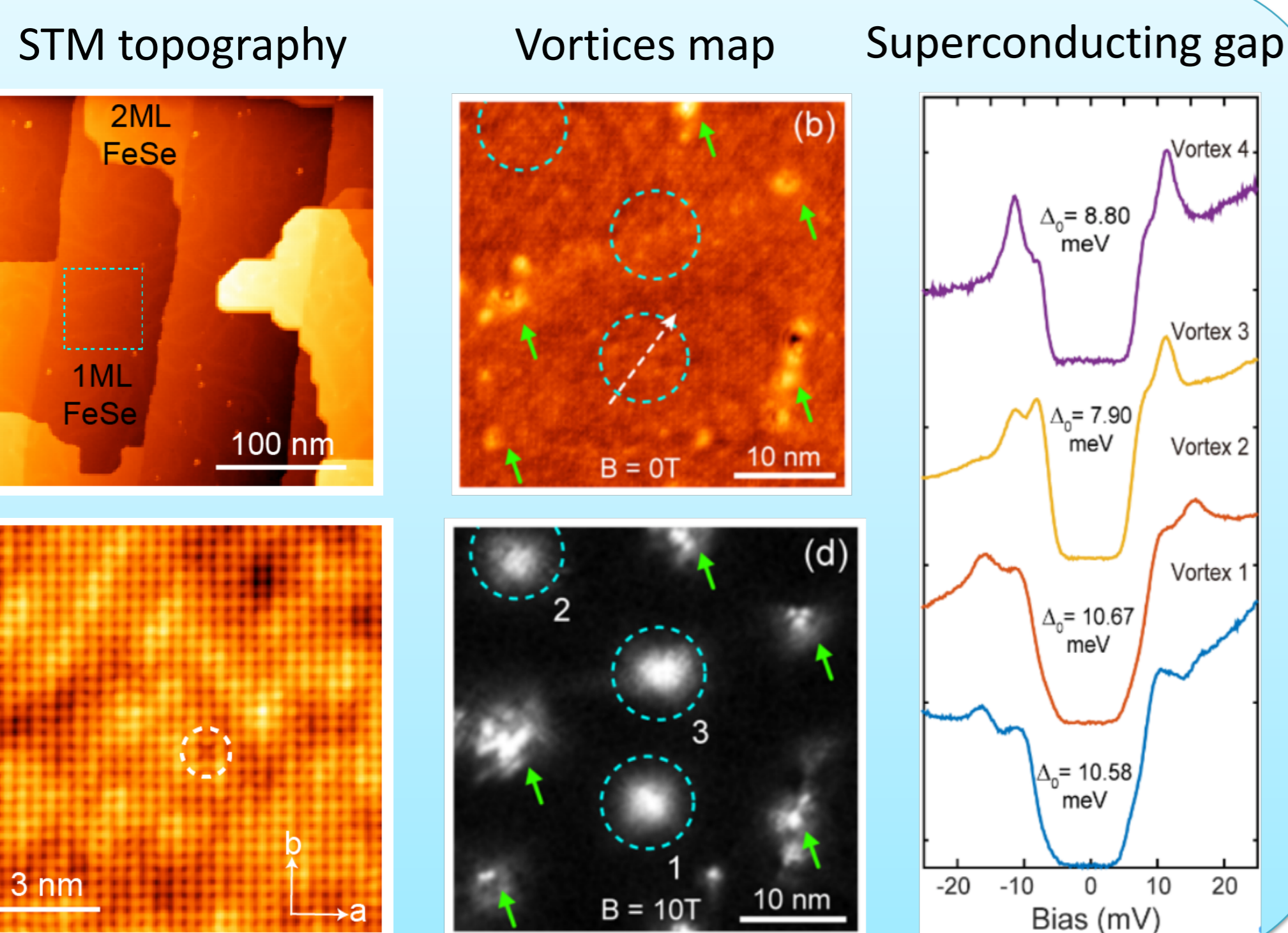


I. Vortex bound states in iron-based superconductor



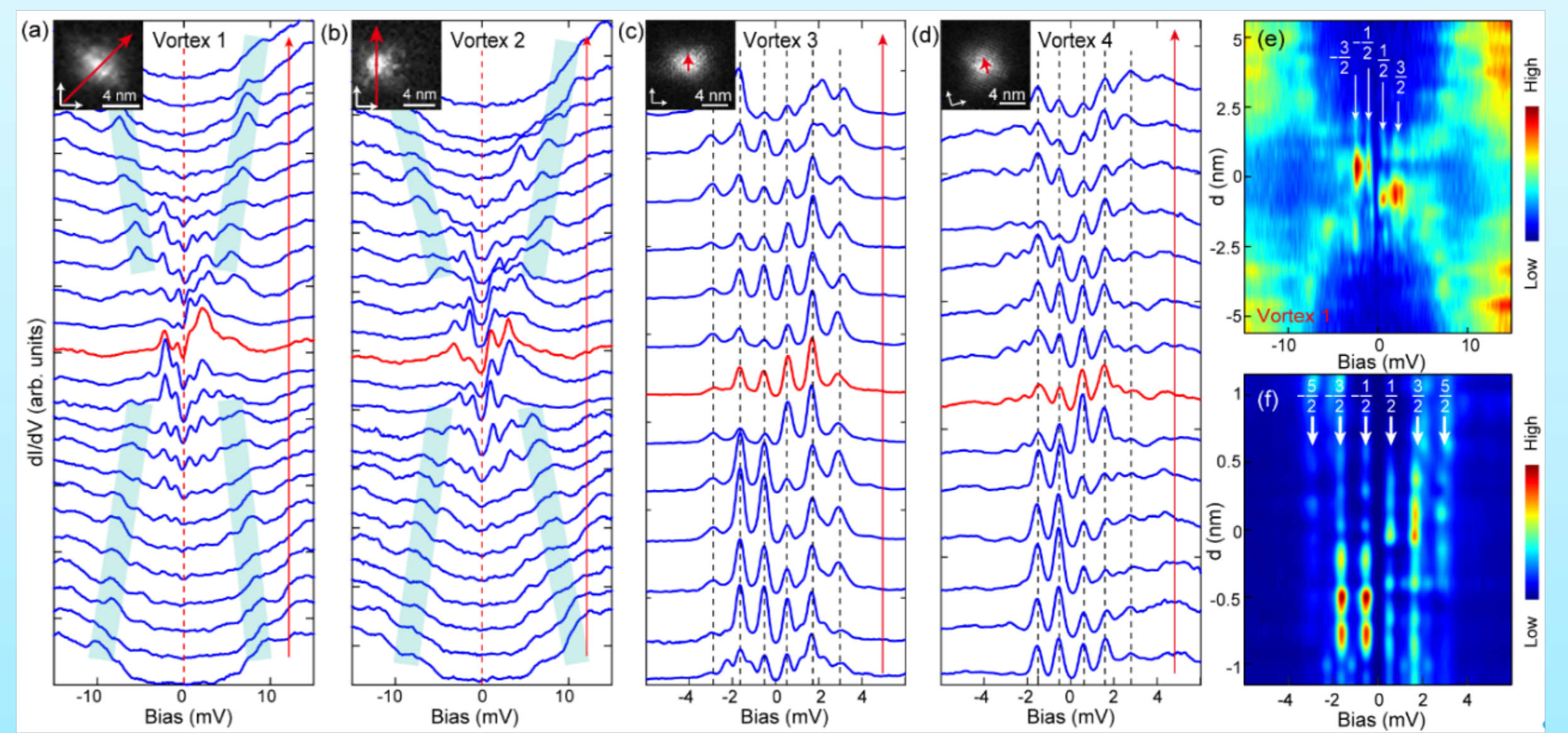
II. Experiments

1ML FeSe film grown on SrTiO₃



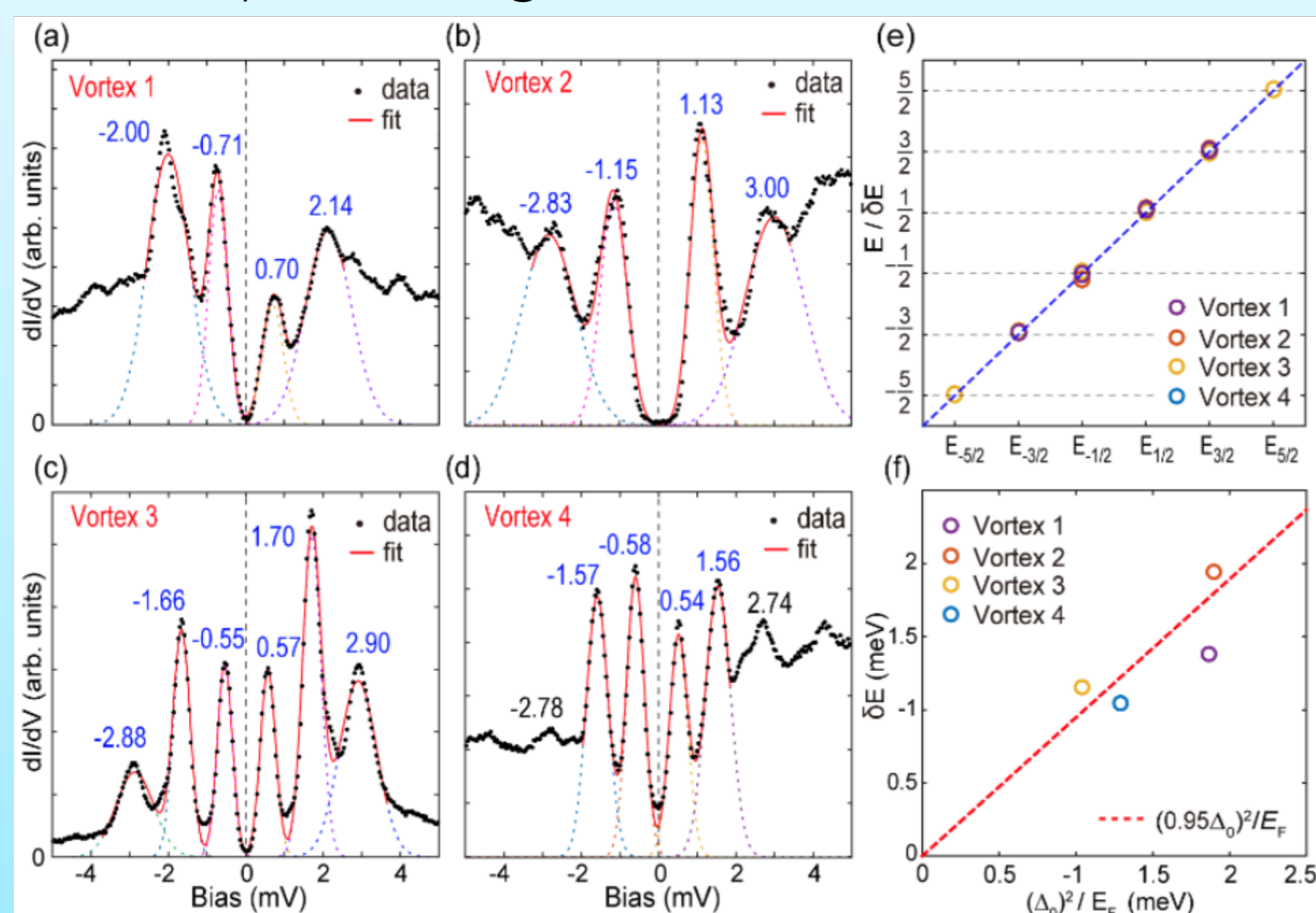
Discrete vortex bound states

Discrete Caroli-de Gennes-Matricon (CdGM) states without a ZBCP can be clearly observed in the free vortex core at T=0.4 K.



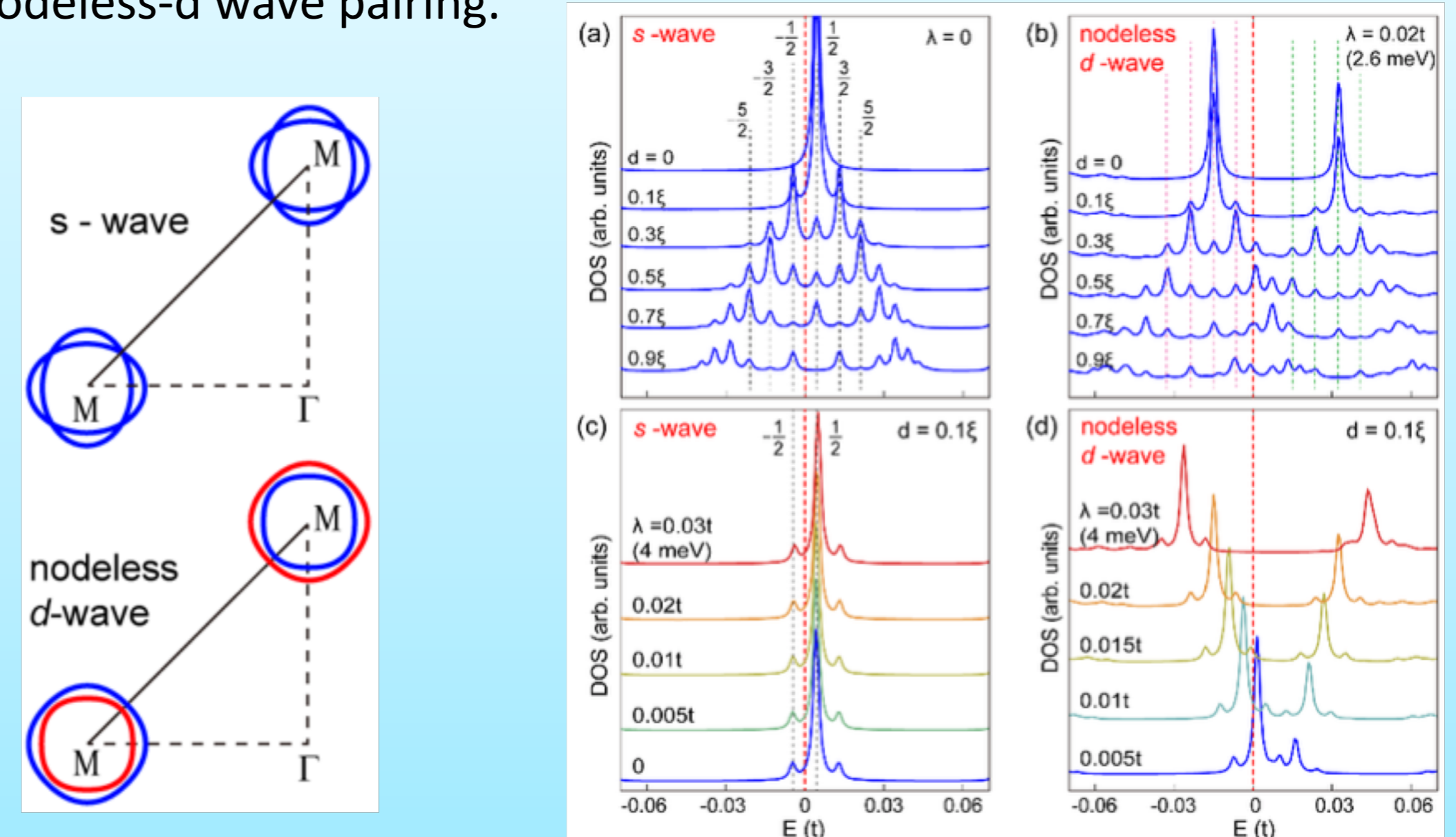
Discrete vortex bound states

These CdGM states are symmetrically distributed with respect to E_F . The energies are consistent with $E = \mu\Delta^2/EF$.



Theoretical calculation of vortex states

Theoretical calculations near the vortex cores under s-wave and nodeless-d wave pairing.



III. Conclusions

- We clearly observed multiple discrete Caroli-de Gennes-Matricon (CdGM) states in the vortex core of single-layer FeSe film on SrTiO₃, and quantitative analysis shows their energies well follow the formula: $E = \mu\Delta^2/EF$. Accompanied with theoretical calculations, our results indicate a s-wave pairing without sign-change in this high-Tc system.

C.Chen *Phys. Rev. Lett.* 124, 097001 (2020)