

Condensed Matter Physics I

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Previously

Semiconductors:

Direct gap / Indirect gap

Holes

Cyclotron resonance

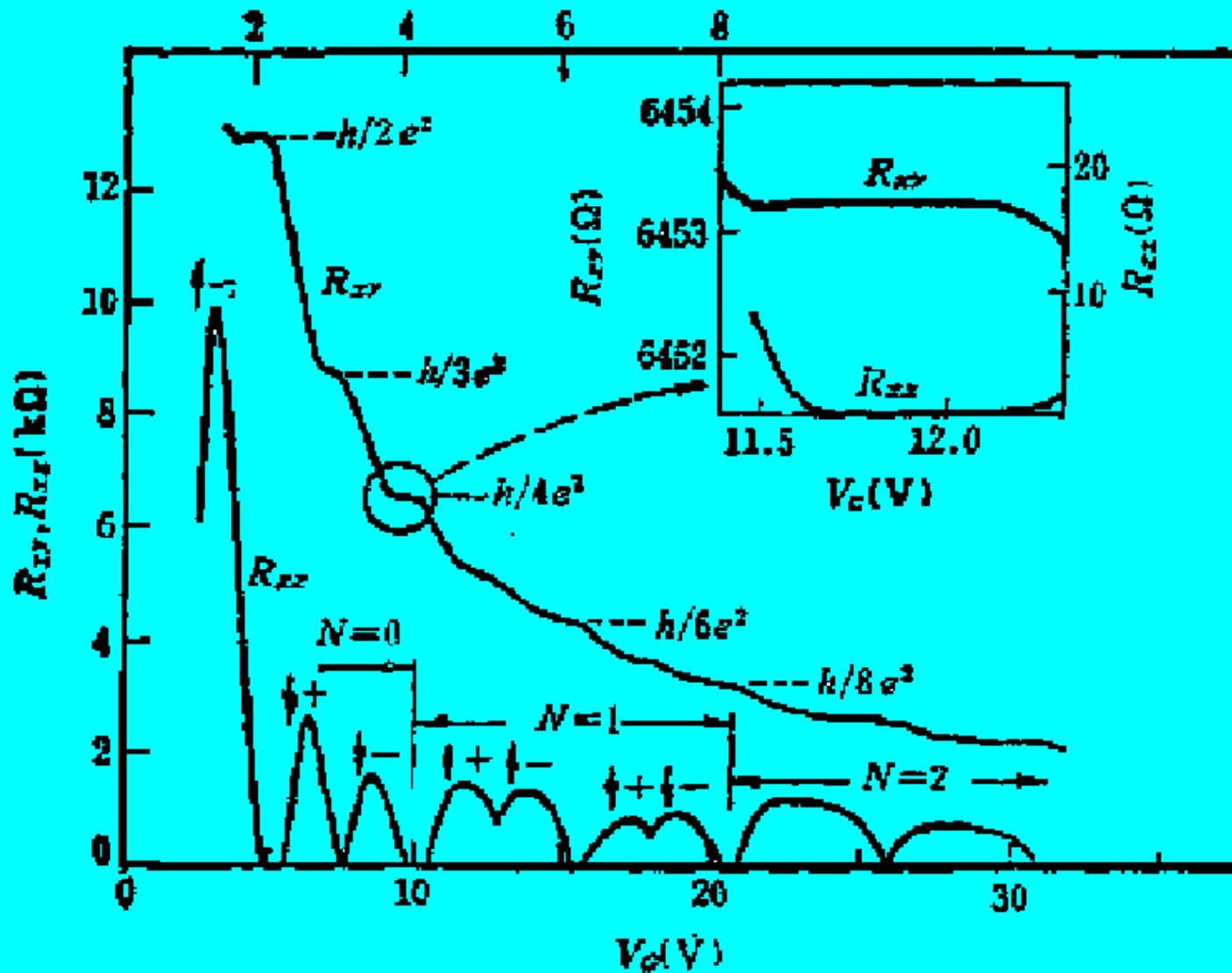
Intrinsic / Extrinsic, carrier statistics

Homogeneous / Inhomogeneous

Quantum Hall effect

Today

Semiconductors
Quantum Hall effect
Magnetism

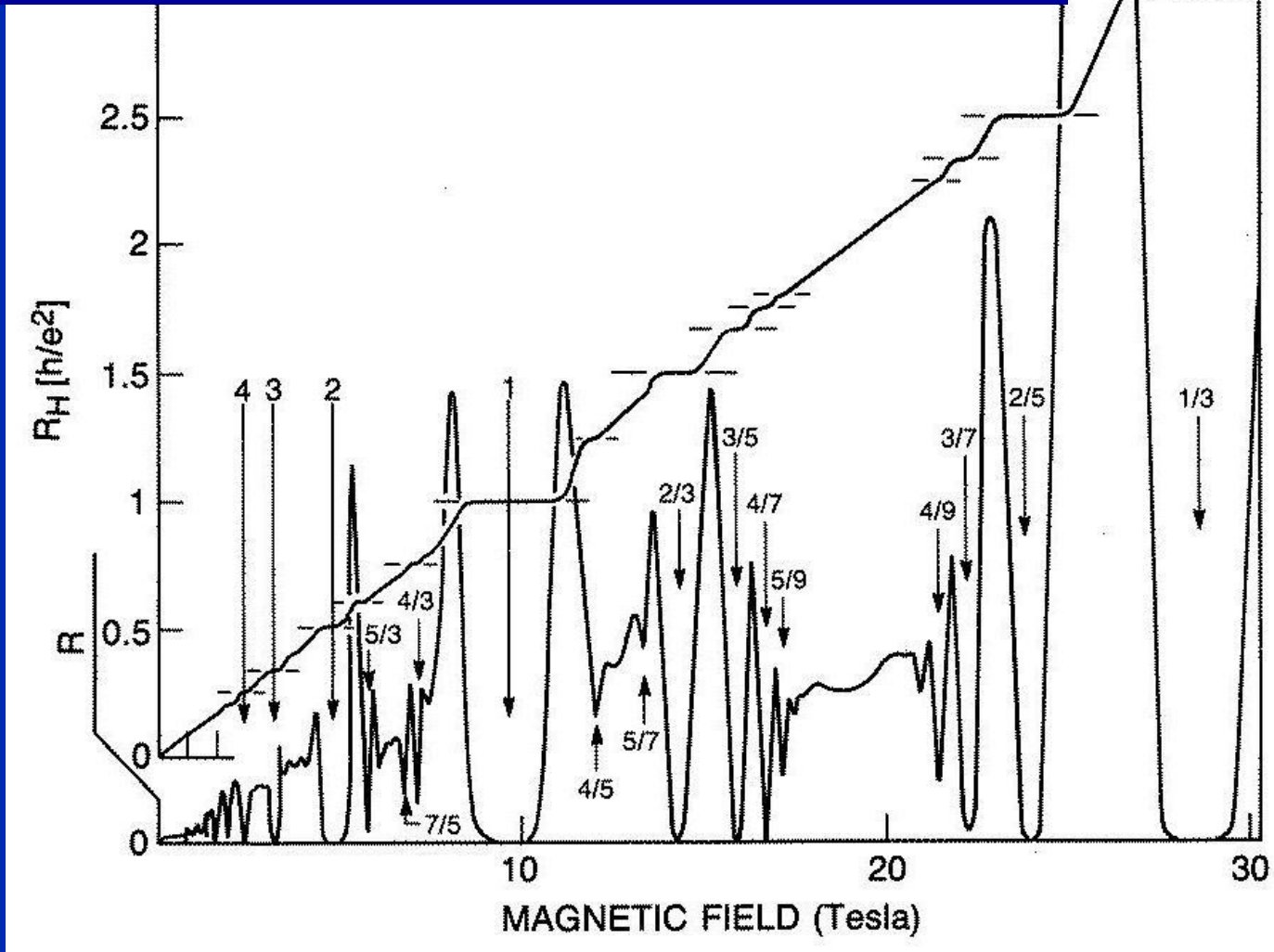


Integer Quantum Hall effect on Si-MOSFET

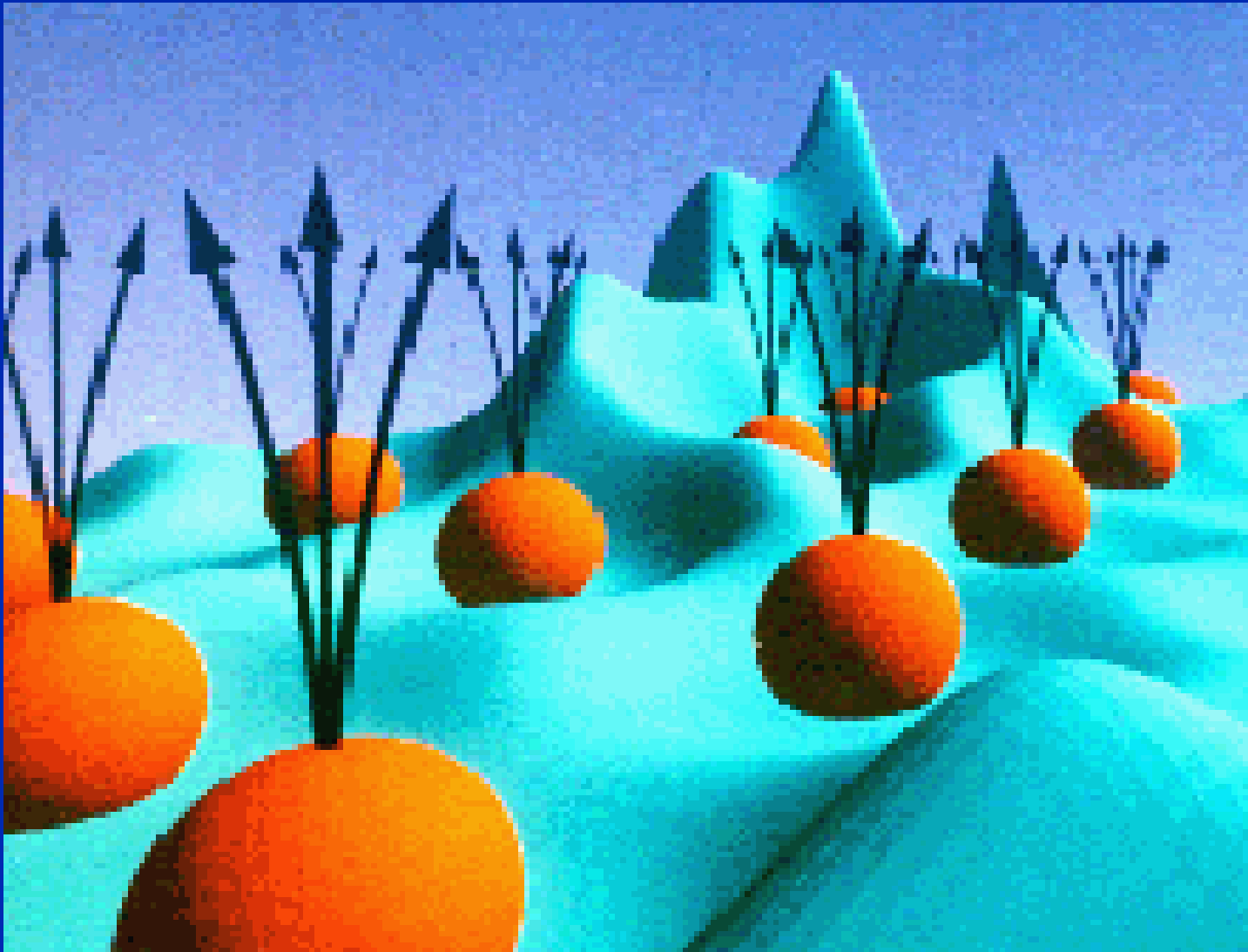
Nobel prize von Klitzing, 1985

Fractional quantum hall effect

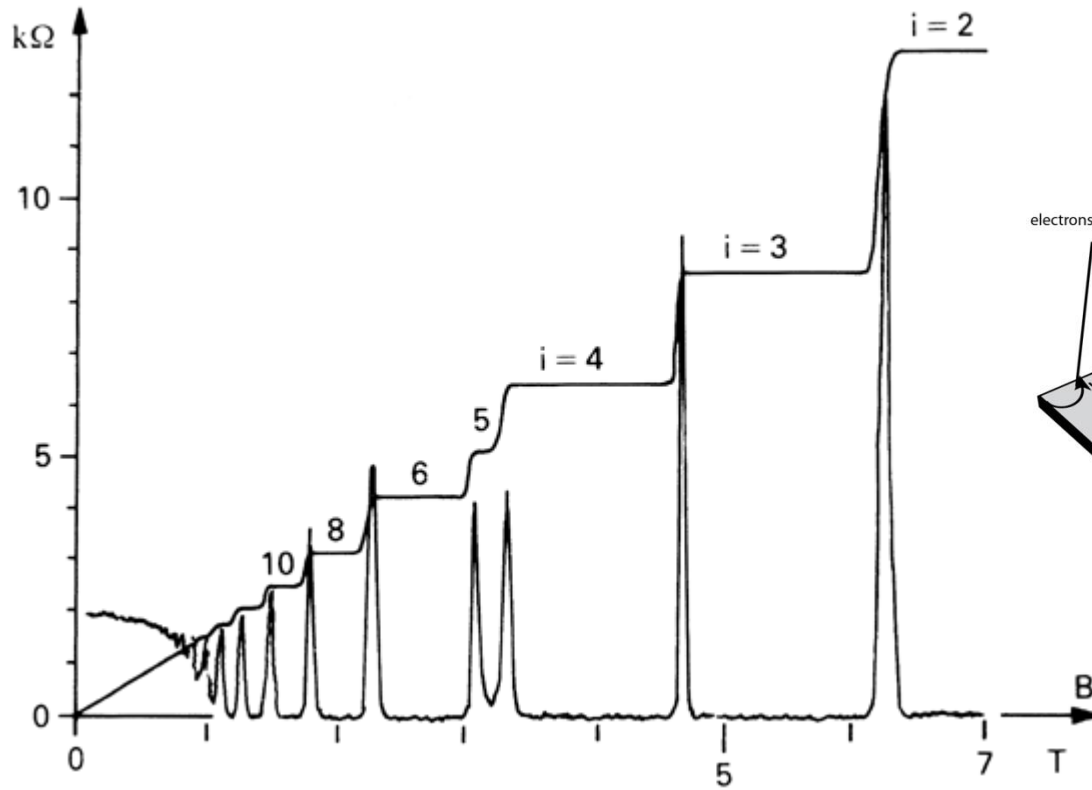
Nobel prize von Laughlin, Tsui & Stormer, 1998



Composite fermions

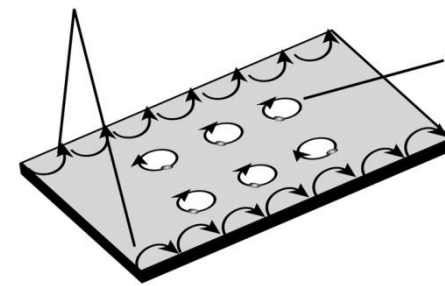


IQHE

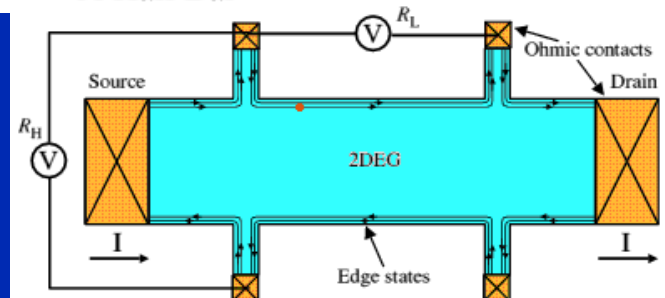


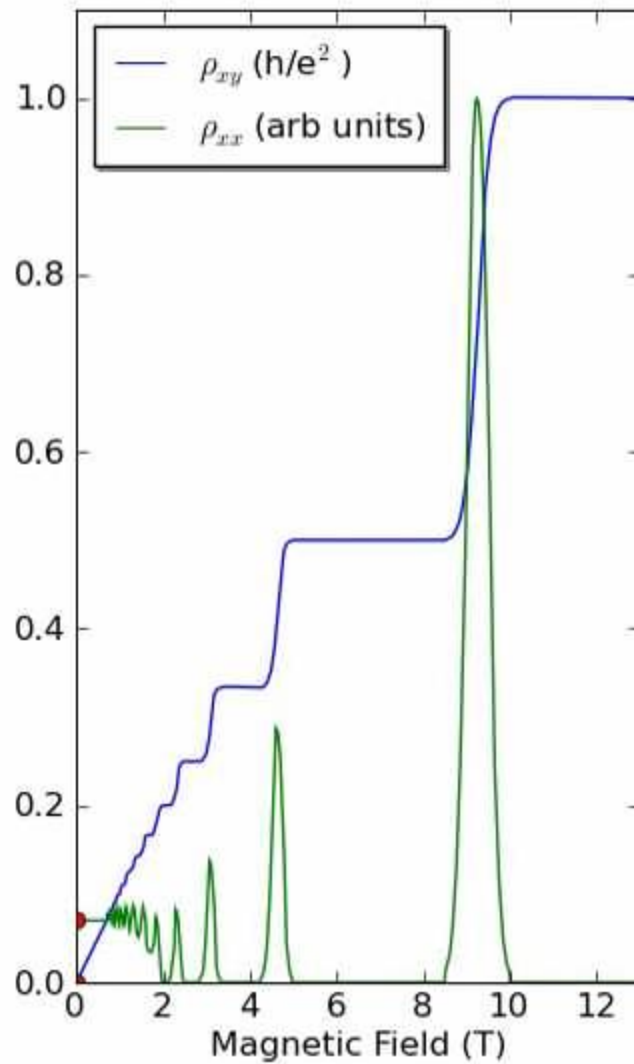
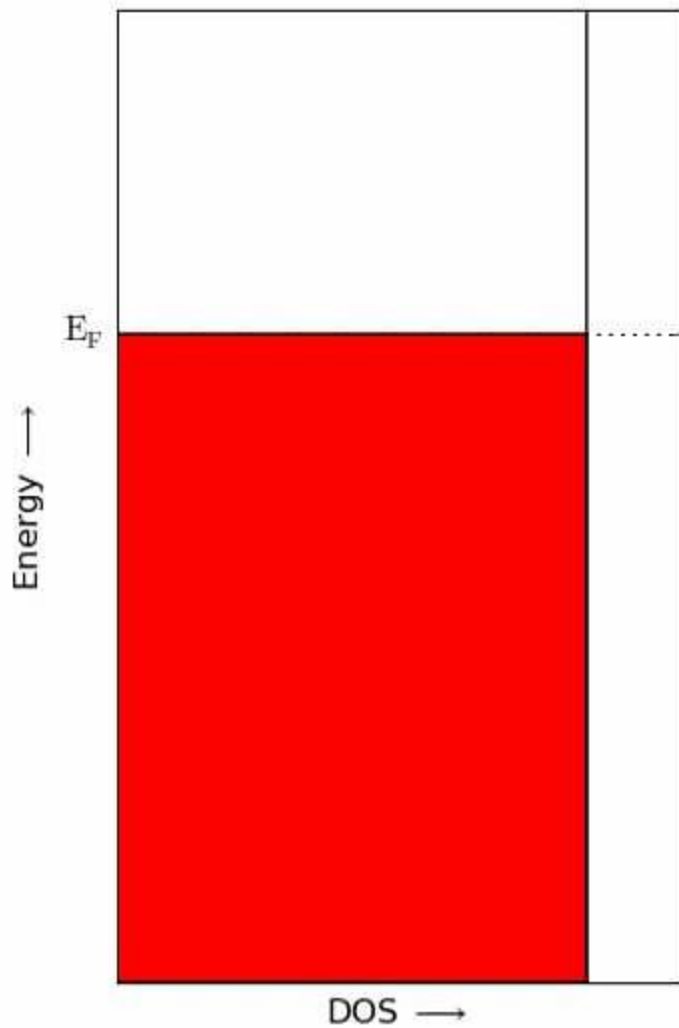
electrons can move along edge (conducting)

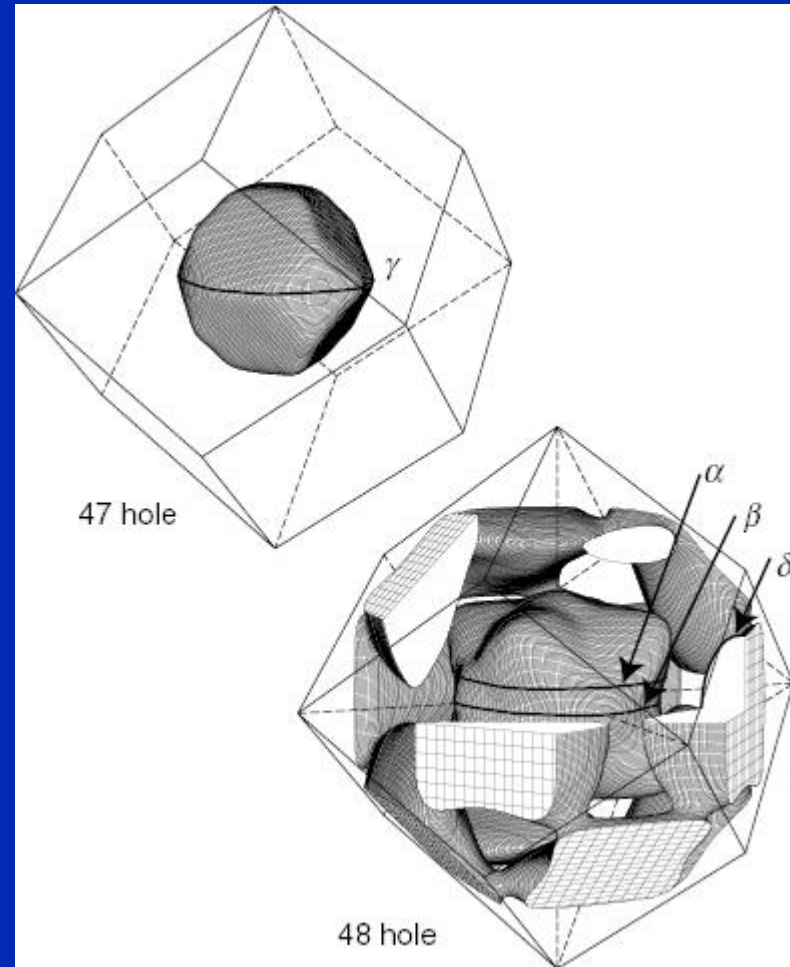
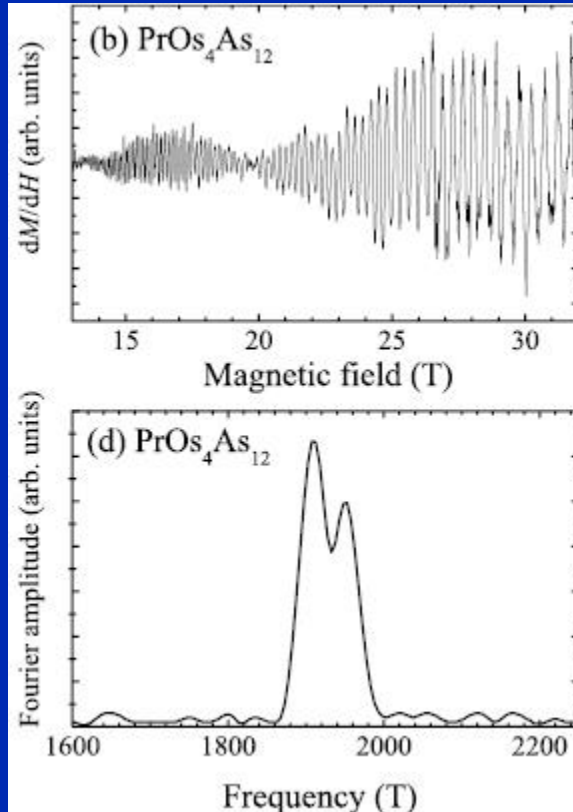
electrons localized in orbits (insulating)



A Hall Bar







New J. Phys. **9** (2007) 269
**A de Haas–van Alphen study of the filled skutterudite
 compounds $\text{PrOs}_4\text{As}_{12}$ and $\text{LaOs}_4\text{As}_{12}$**
Ho et al.