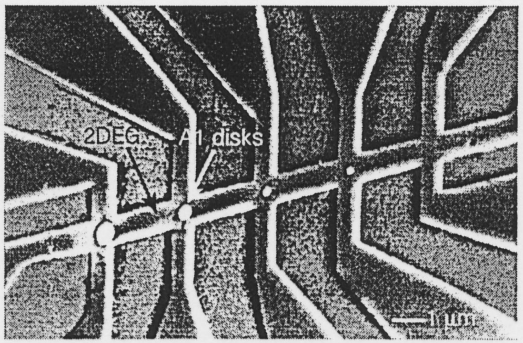
低温物理学

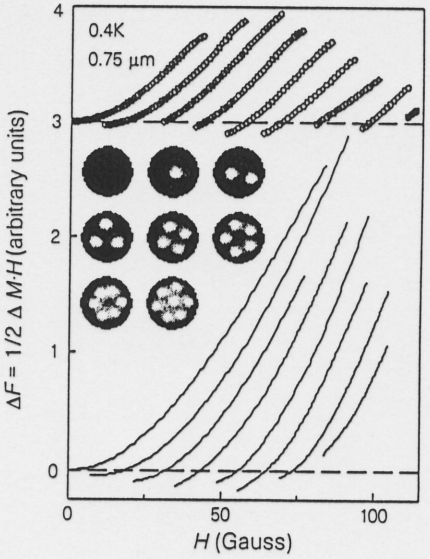
第4回 2009年4月30日

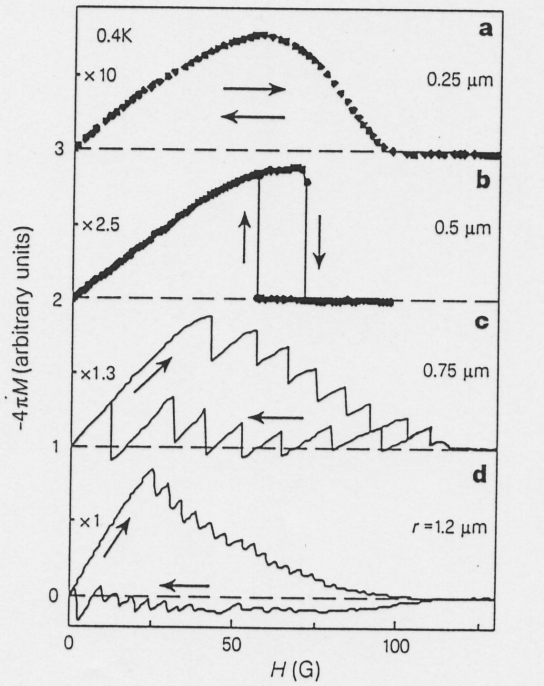
勝本信吾

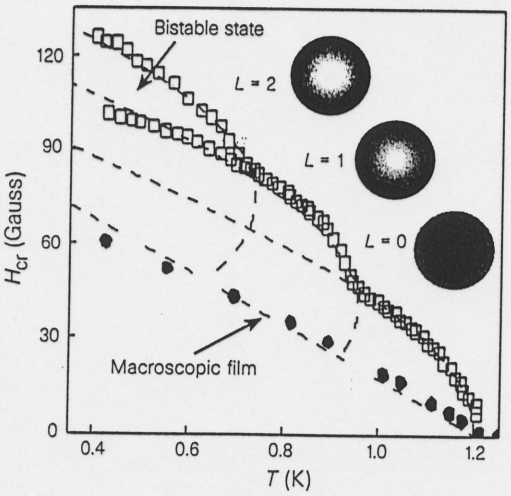
２次元電子系で渦糸状態を検出

A.K. Geim et al.
Nature **390**, 259 (1997)

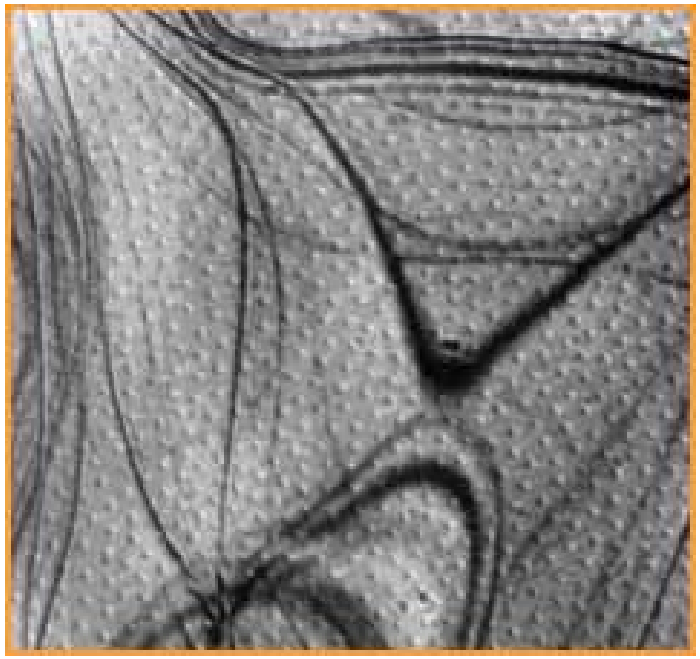








Lorentz顕微鏡によるvortex運動の観察

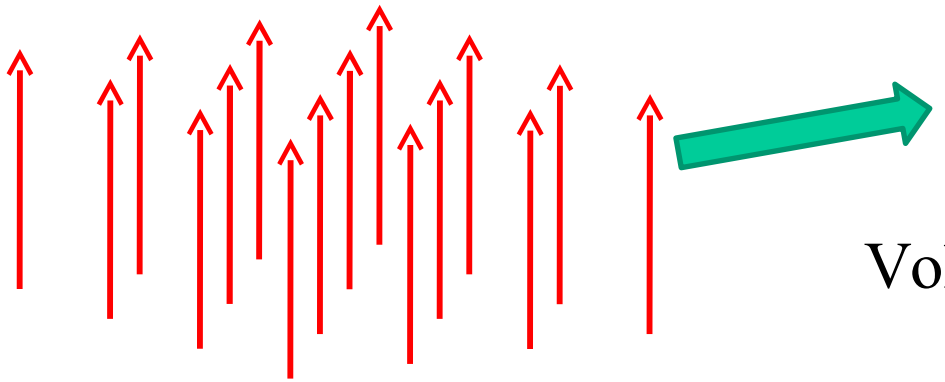


Nb

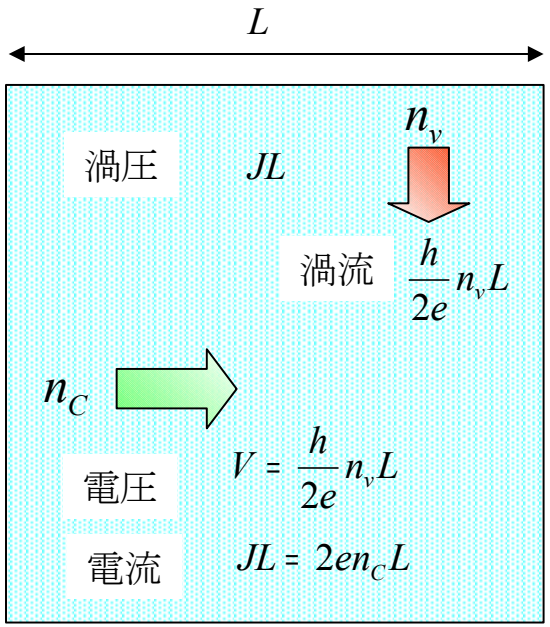
Hitachi
Tonomura
group

磁束の運動と電気抵抗

$$F_{\mathrm{Lorentz}} = \Phi_0 j_{\mathrm{ext}}$$



Voltage 発生



$$R = \frac{V}{JL} = \frac{h}{4e^2}\frac{n_v}{n_C} \qquad R_v = \frac{4e^2}{h}\frac{n_C}{n_v}$$

自己双対性成立⇔臨界点

$$R \leftrightarrow \frac{1}{R_v} \qquad R_{\mathrm{crit}} = \frac{h}{4e^2}$$

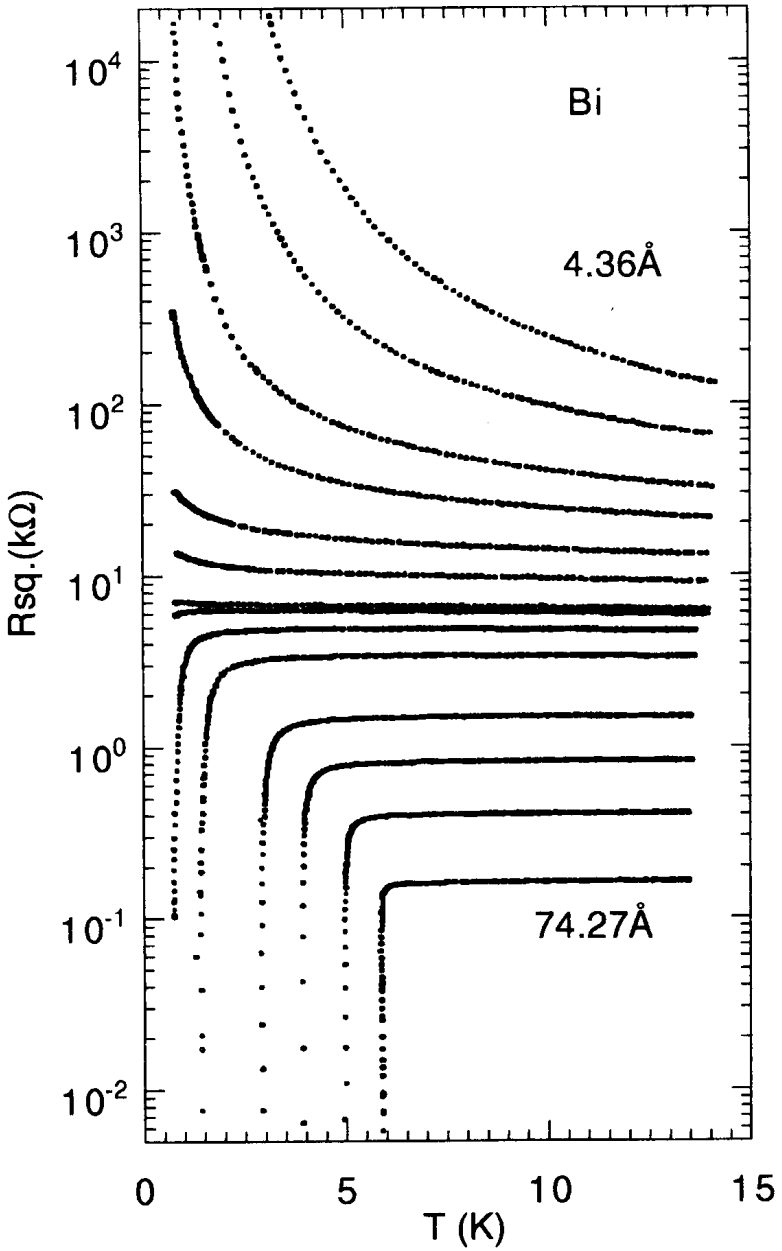


Fig. 20. Evolution of the temperature dependence of the sheet resistance with thickness for a Bi QCF deposited on a Ge buffer layer. From Ref. 63.

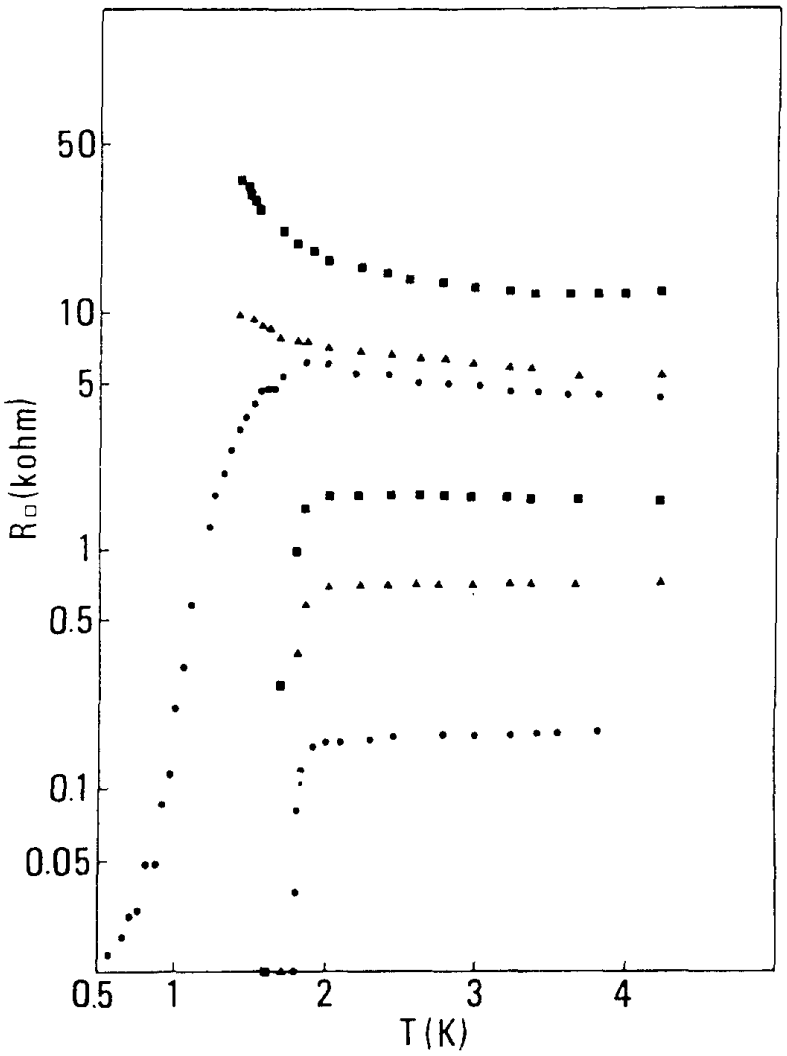
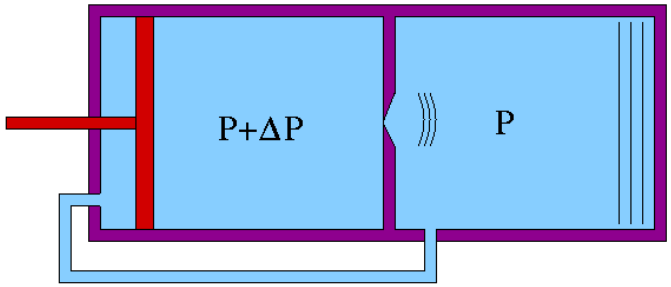
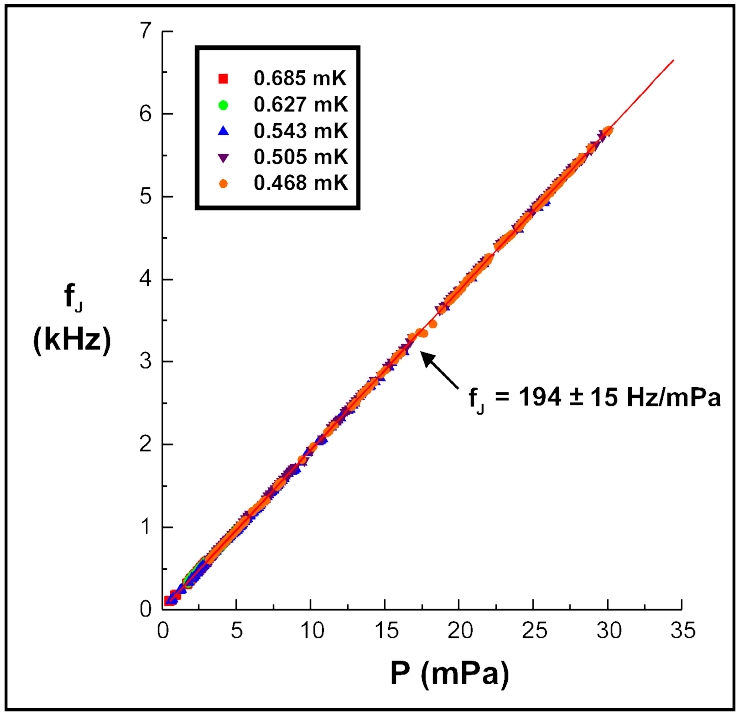


Fig. 23. Temperature dependence of sheet resistance for six different samples of Al FOMP's with average granule size of 15 Å. From Ref. 141.

“Josephson sound” in Helium superfluid

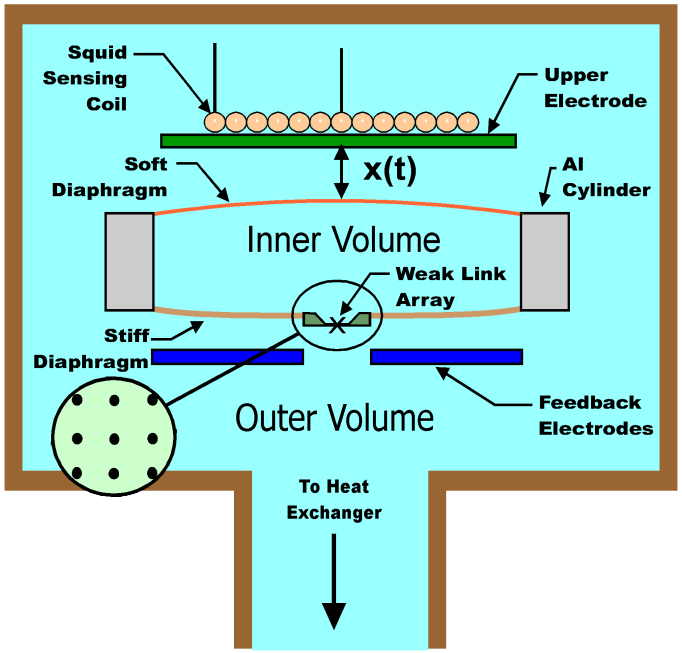


AC Josephson Effect

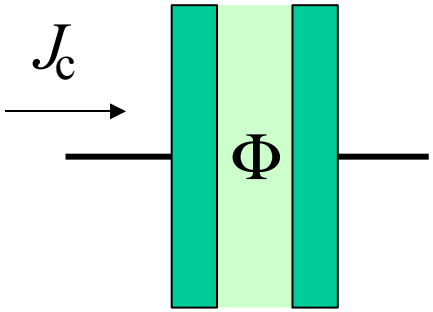


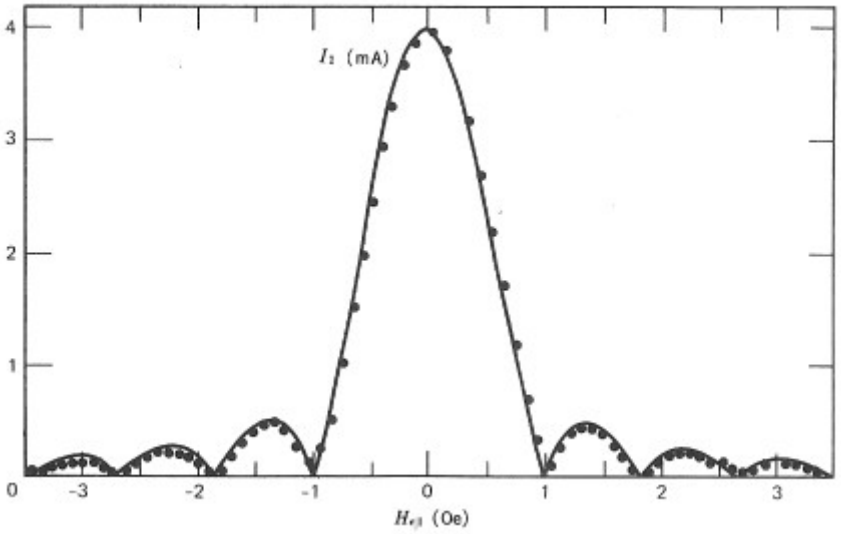
S. V. Pereversev *et al*. Nature **388**. 449-451 (1997)

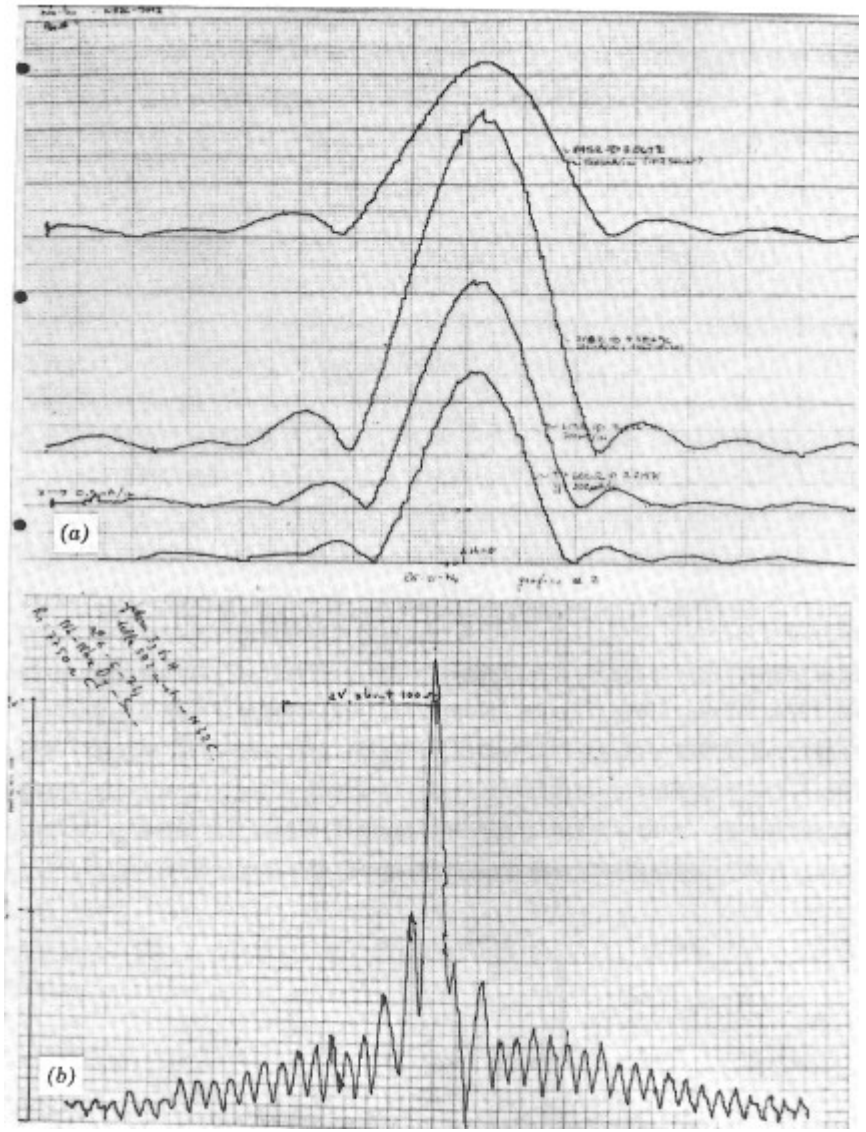
Basic Experimental Cell Design



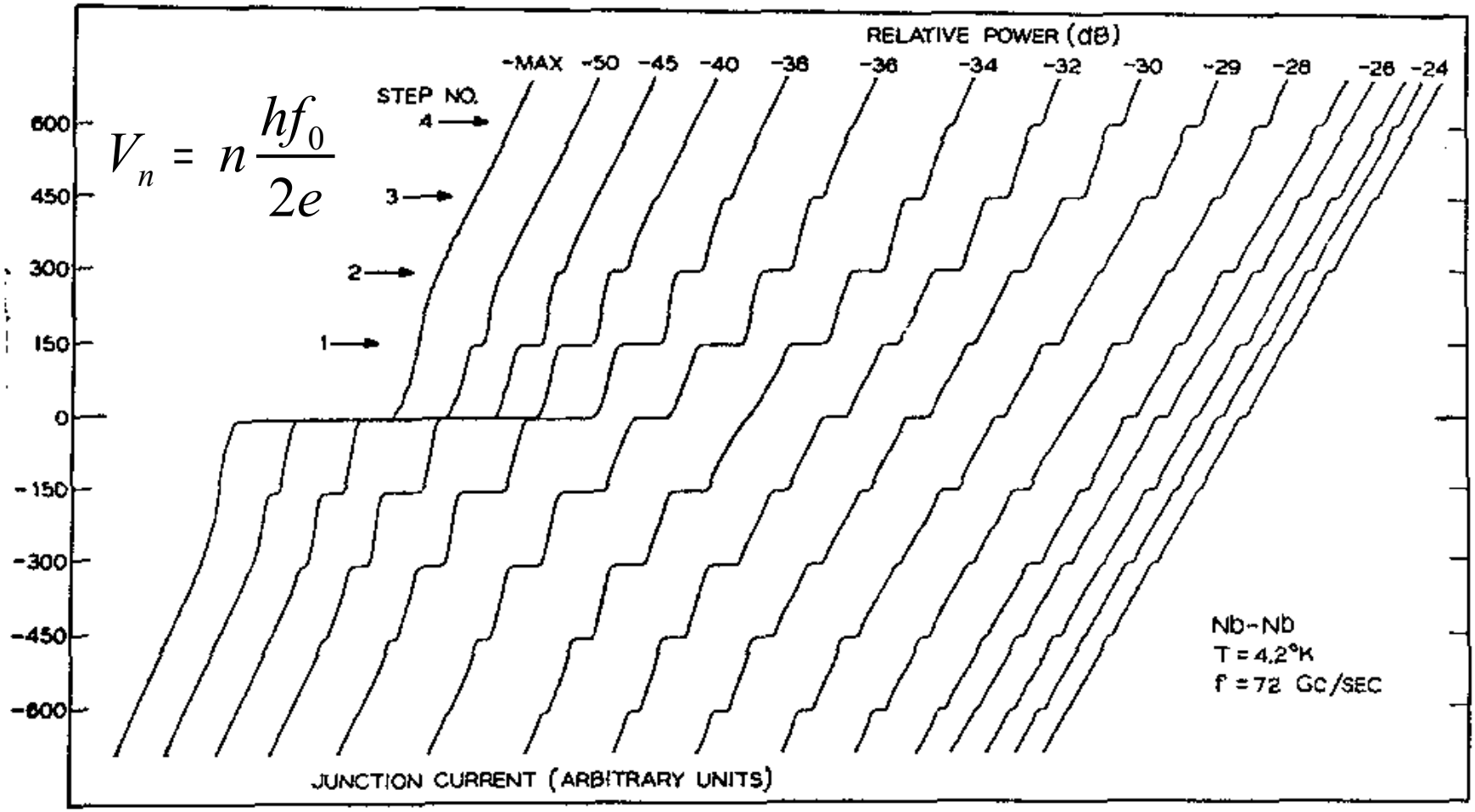
Josephson接合に現れたFraunhoferパタン



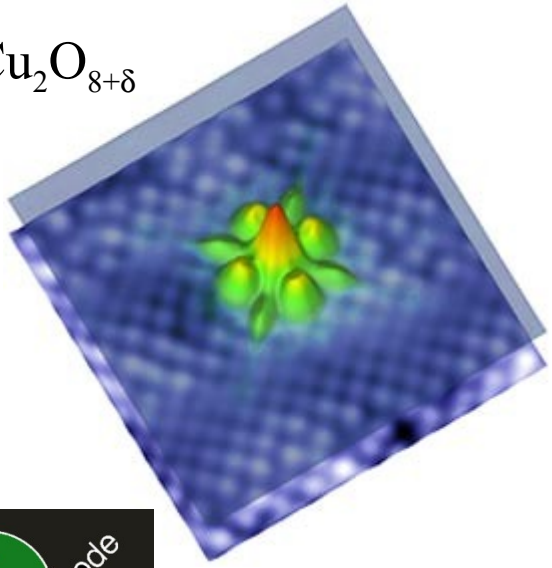


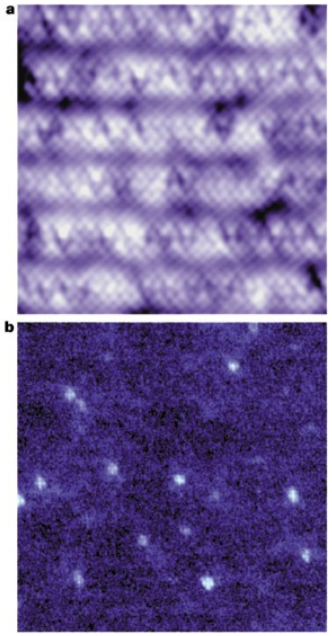


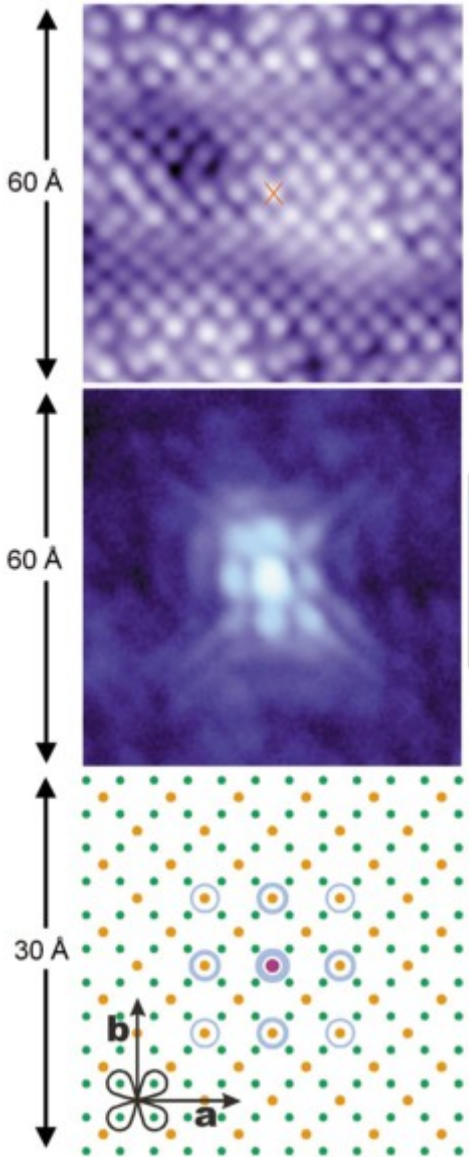
Shapiro Steps

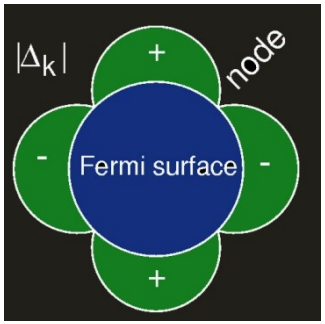


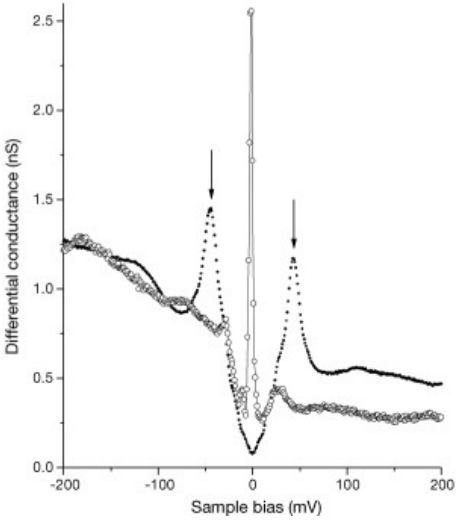
$Bi_2Sr_2CaCu_2O_{8+\delta}$

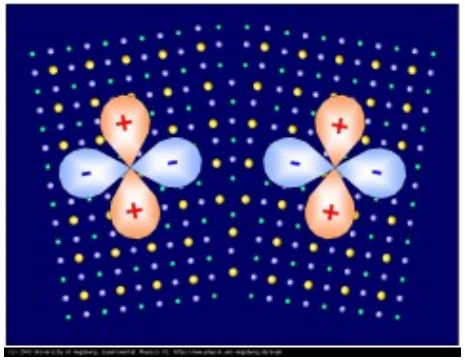












S. H. Pan et al. Nature *Nature* **403**, 746-750 (2000)