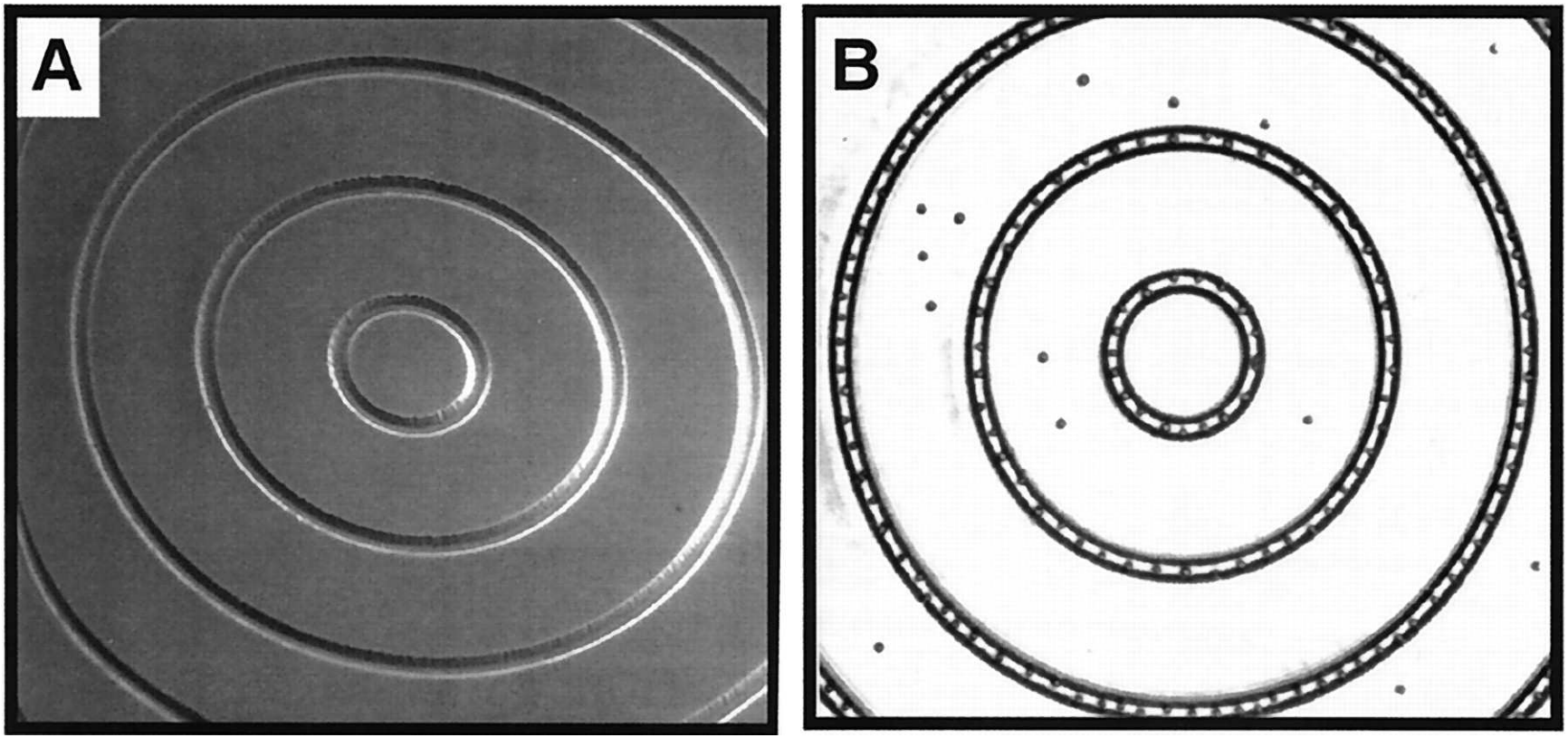
Single file diffusion

Single-file diffusion of colloids in one-dimensional channels

Wei, Bechinger & Leiderer, Science **287** (2000) 625



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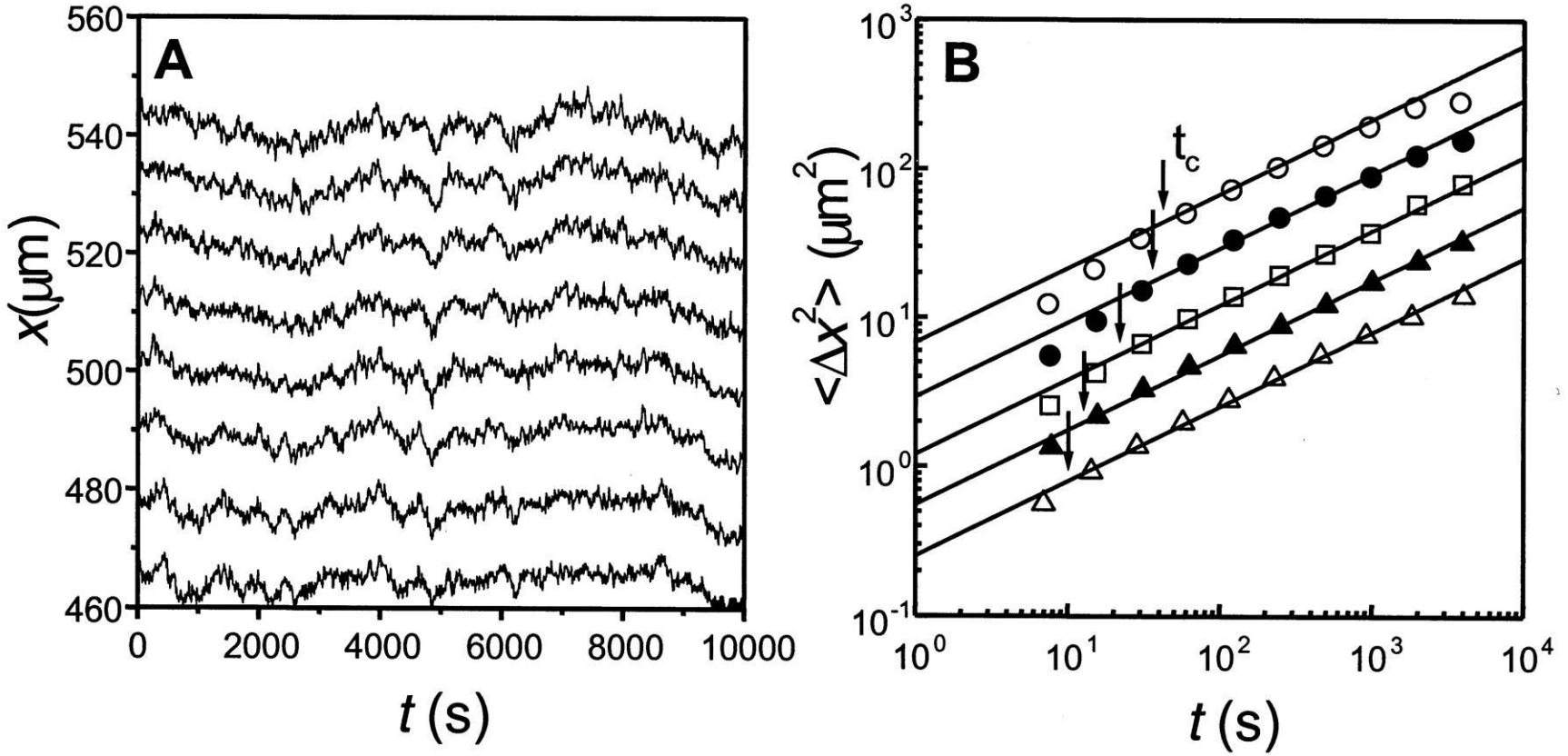

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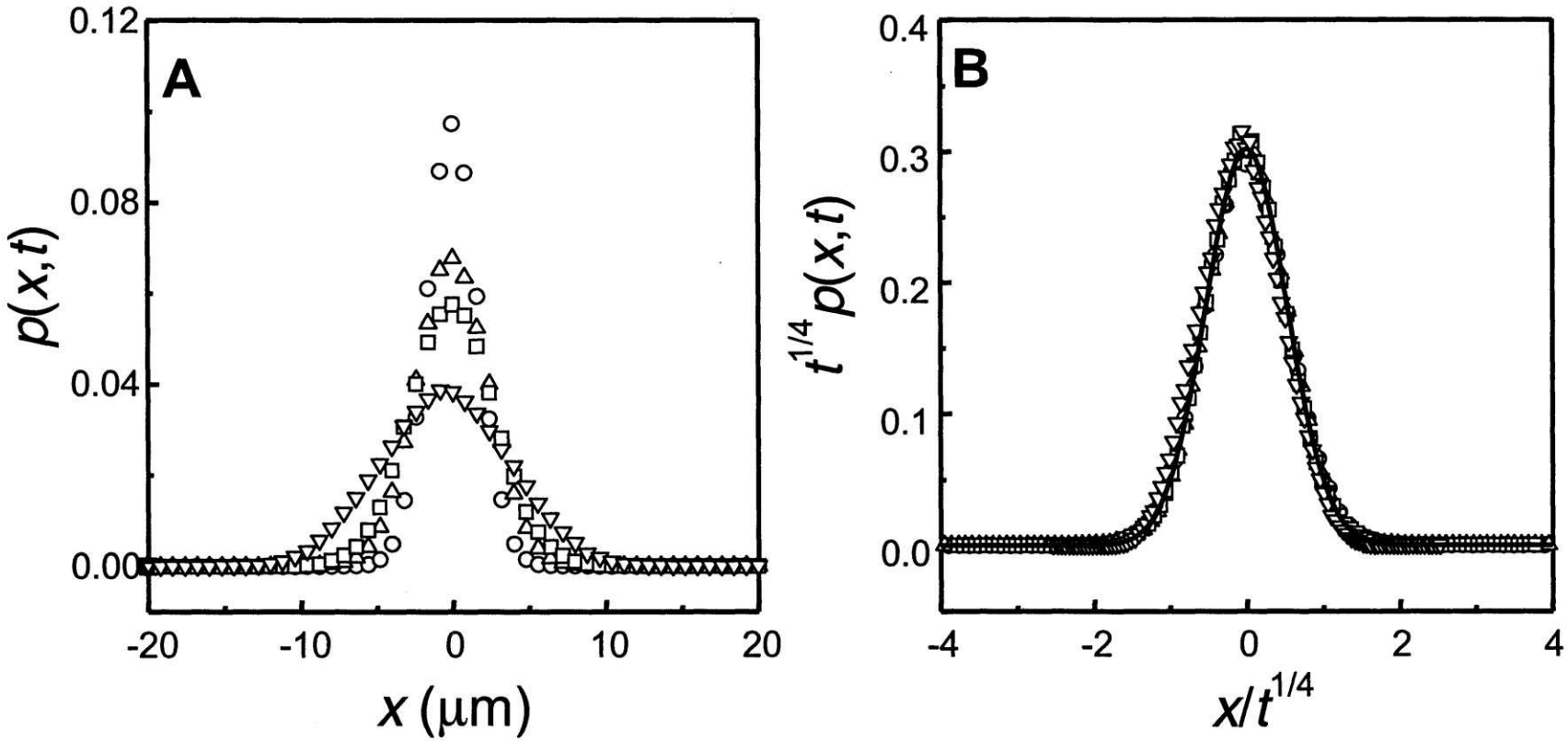
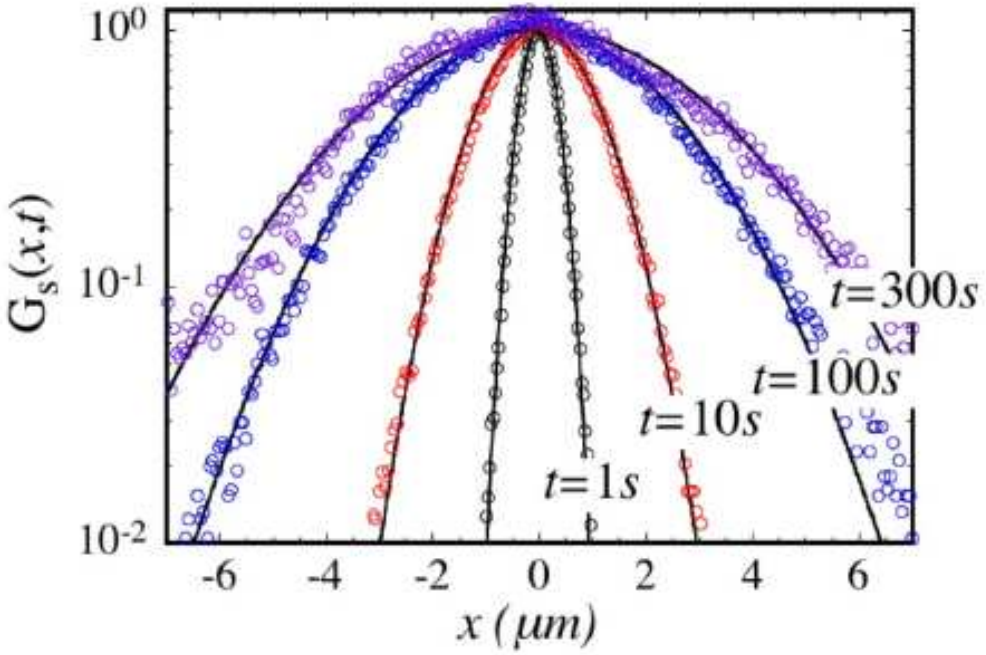
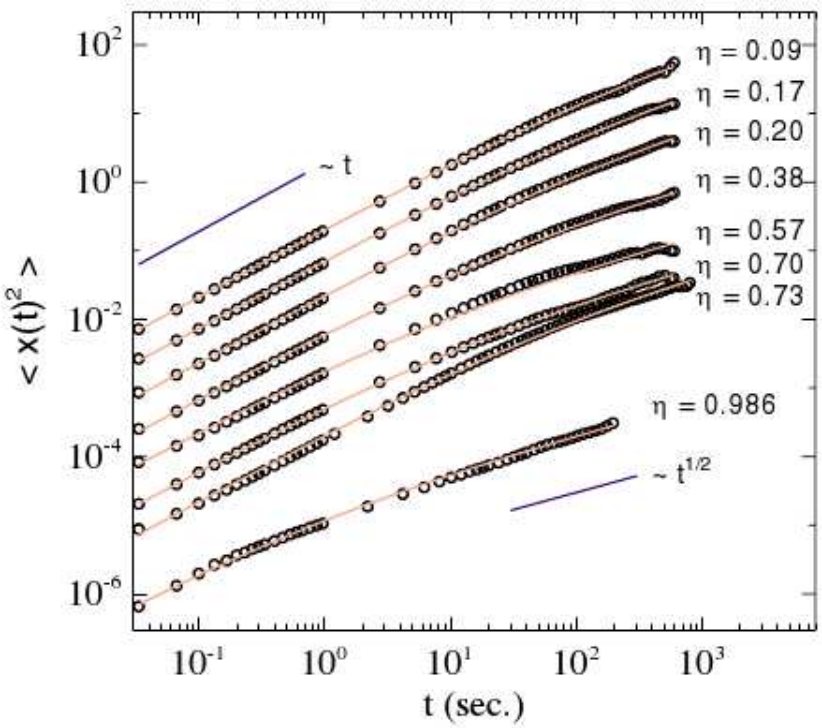


From random walk to single-file diffusion

Lin, Meron, Cui, Rice & Diamant, Phys. Rev. Lett. **94** (2005) 216001





- η: particle density

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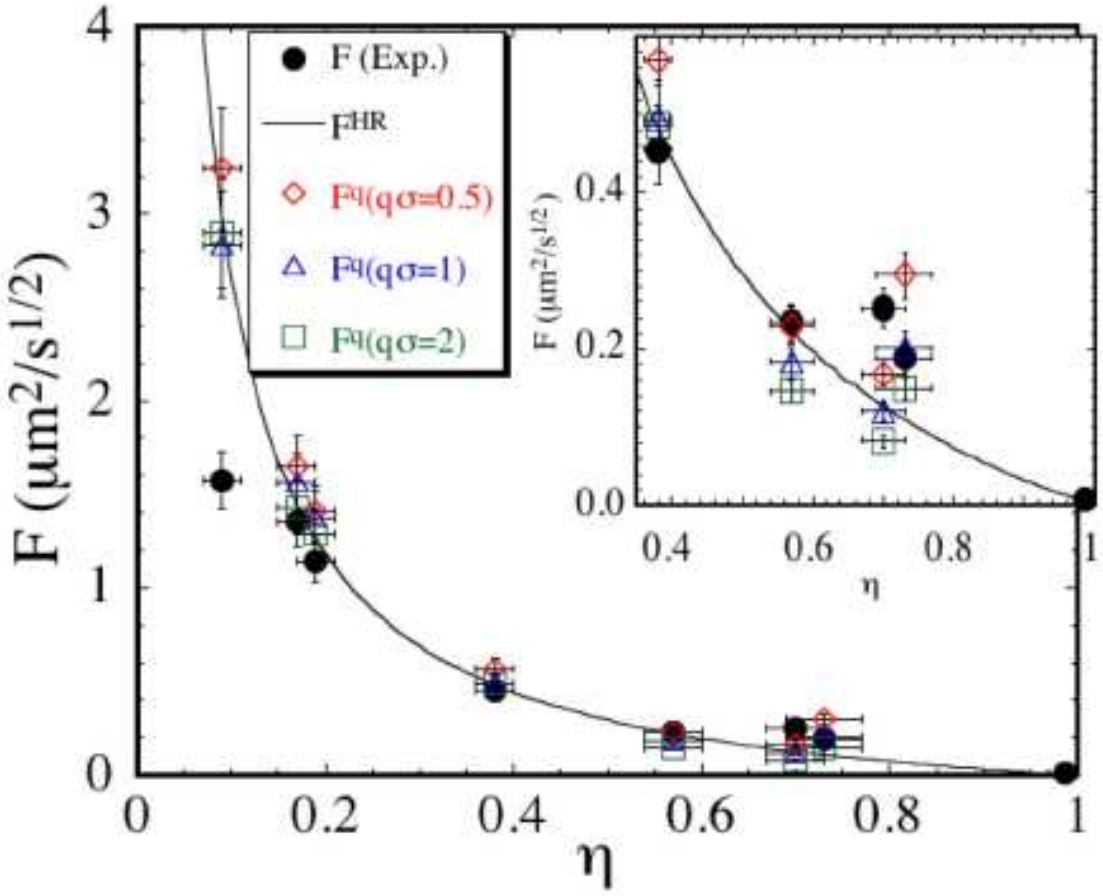


- "mobility": $F = \langle X_0^2 \rangle / \sqrt{t} \sim (1-\eta)/\eta$

Fluctuations of crystal steps

Scanning tunneling microscopy of a copper surface

M. Giesen & G.Schulze Icking-Konert, Surf. Sci. **412/413** (1998) 645

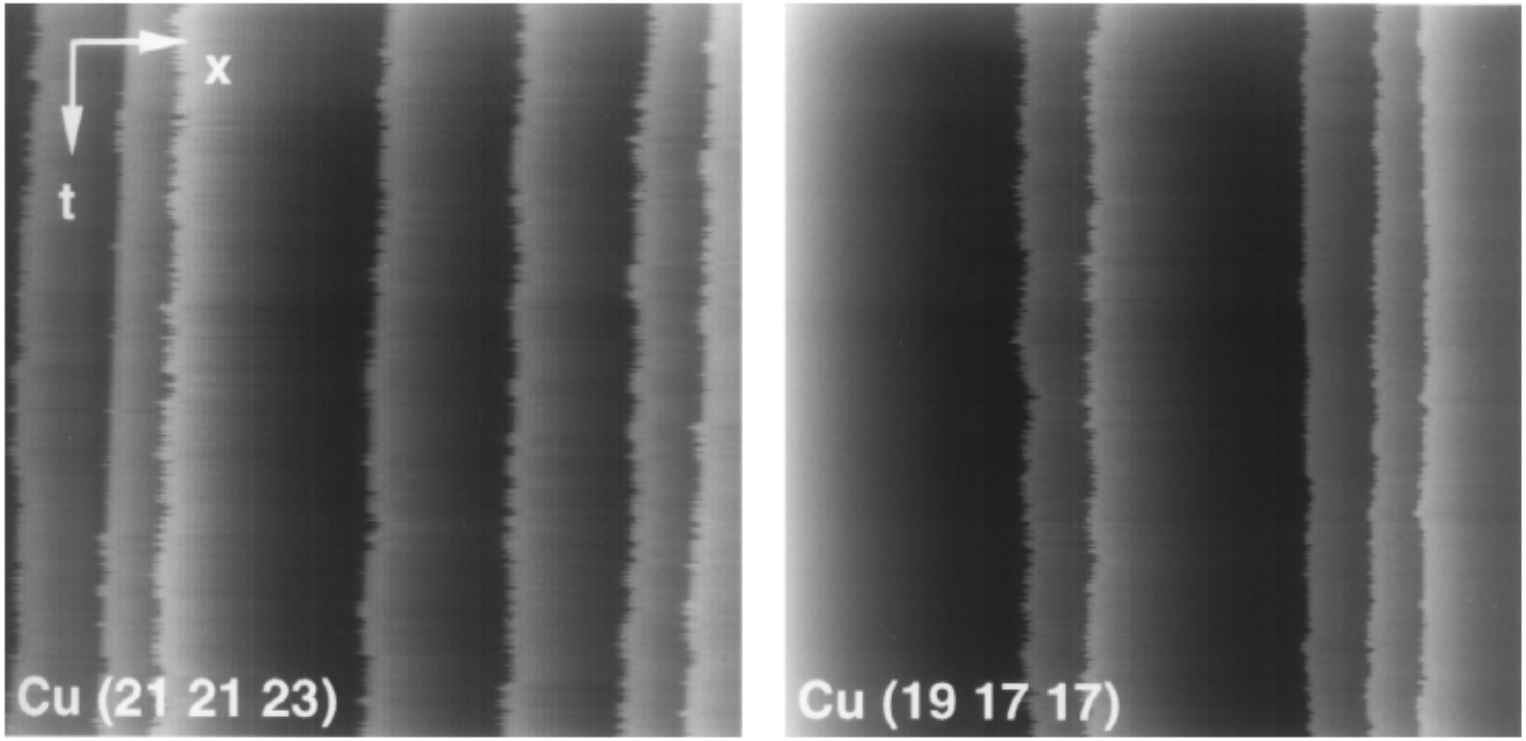
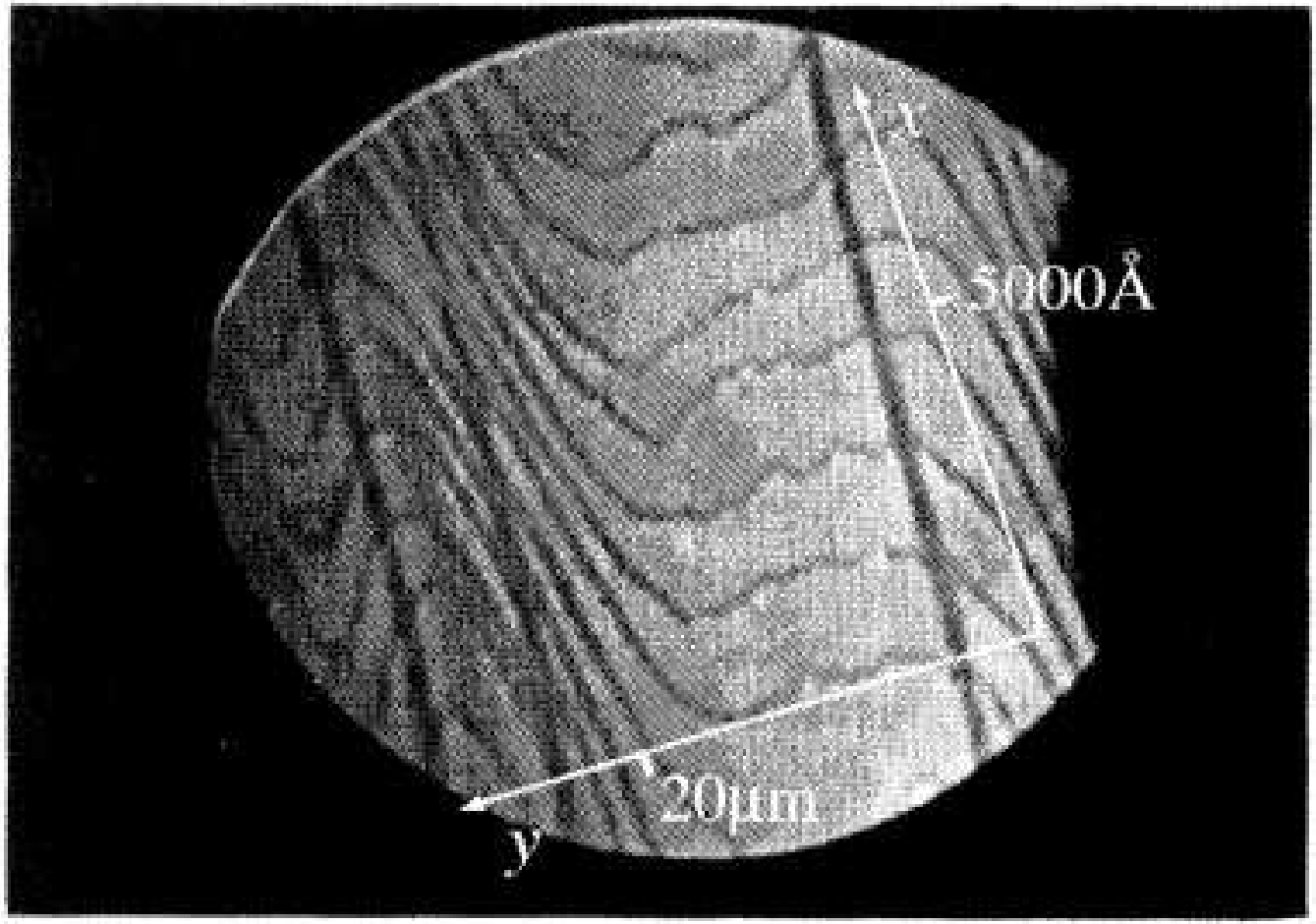


Fig. 1. Time images of Cu (21 21 23) and (19 17 17) at 310 K. The total time for each image is 45 s and the scan width is 194 nm.

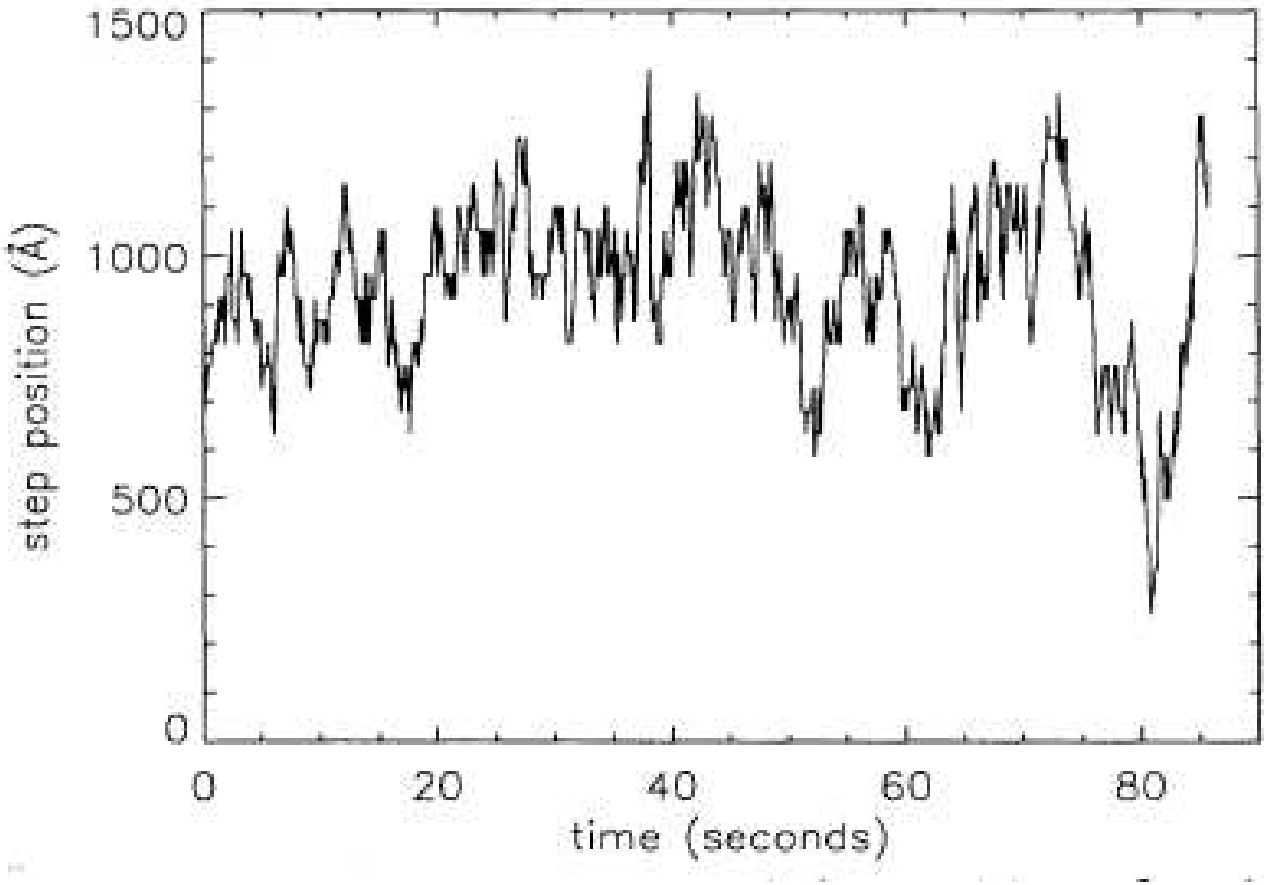
Reflection electron microscopy of a silicon surface

Bartelt et al., Phys. Rev. B **48** (1993) 15453



Brownian motion of steps on Si(111)

Bartelt et al., Phys. Rev. B **48** (1993) 15453



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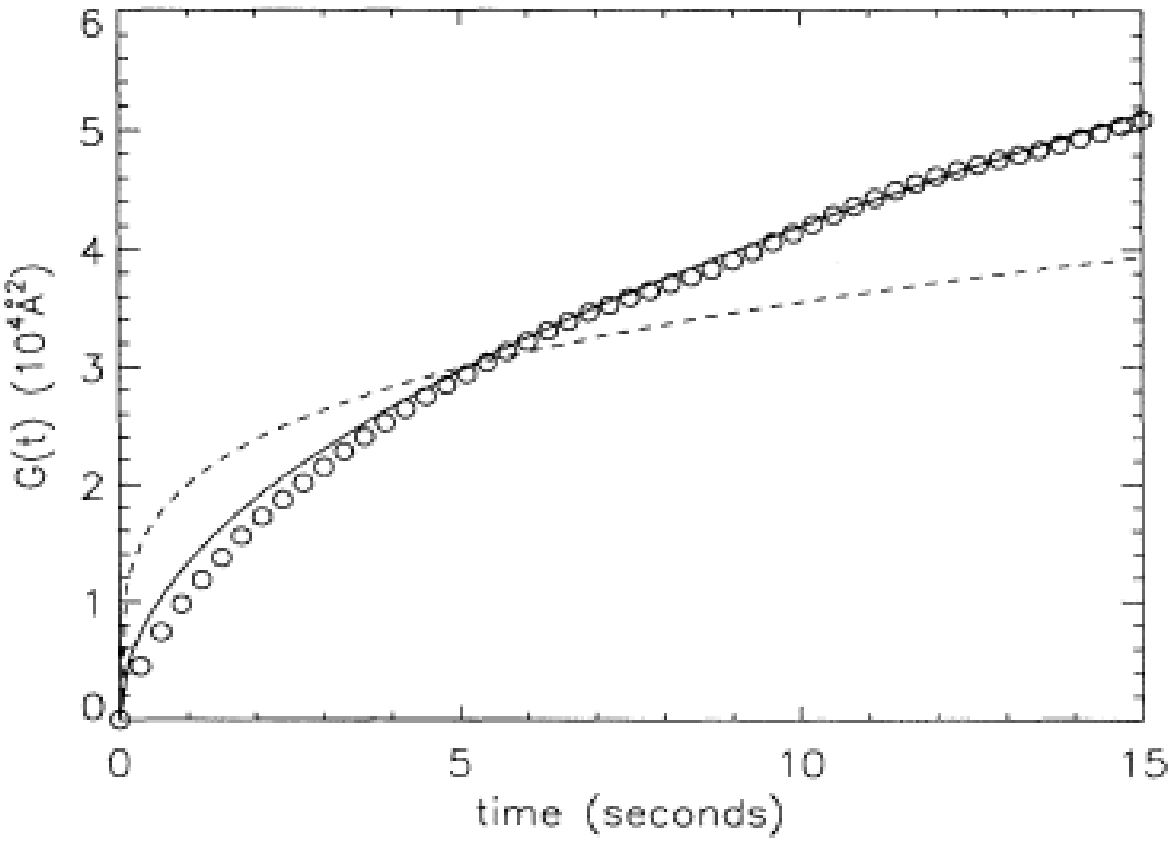

$$G(t) = \langle [h(x,t) - h(x,0)]^2 \rangle \sim t^{1/2} \text{ vs. } t^{1/4}$$

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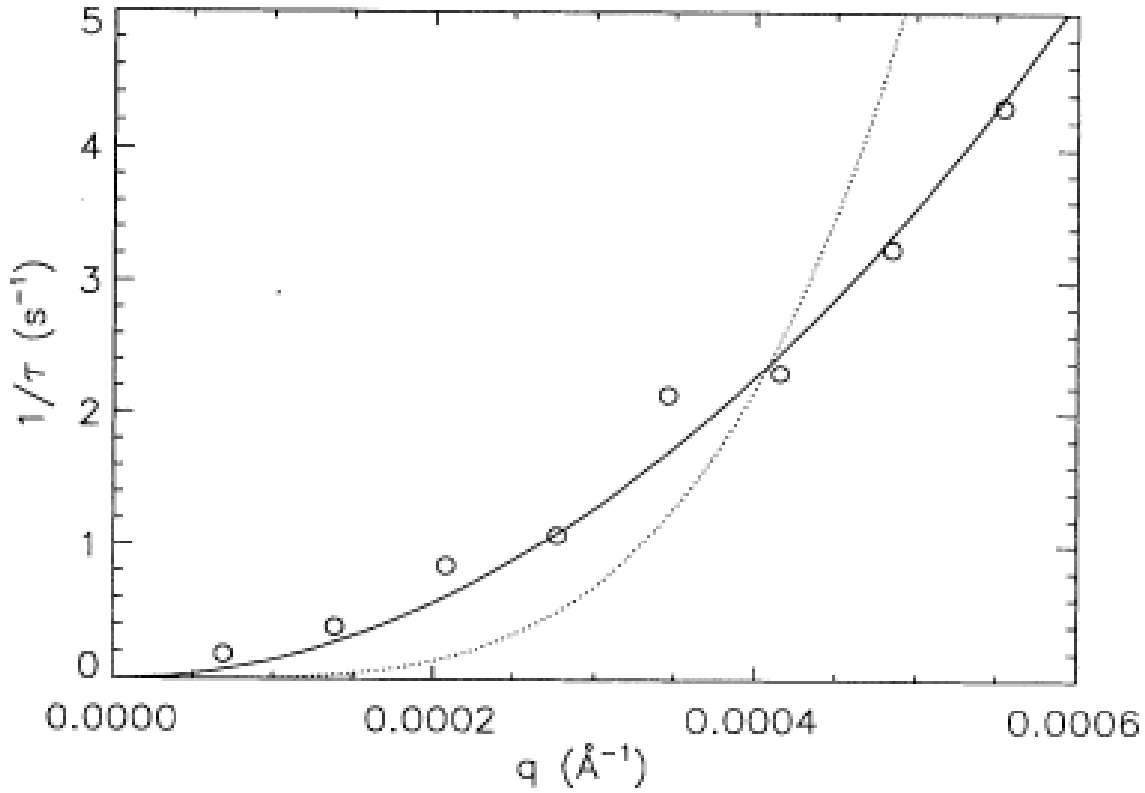
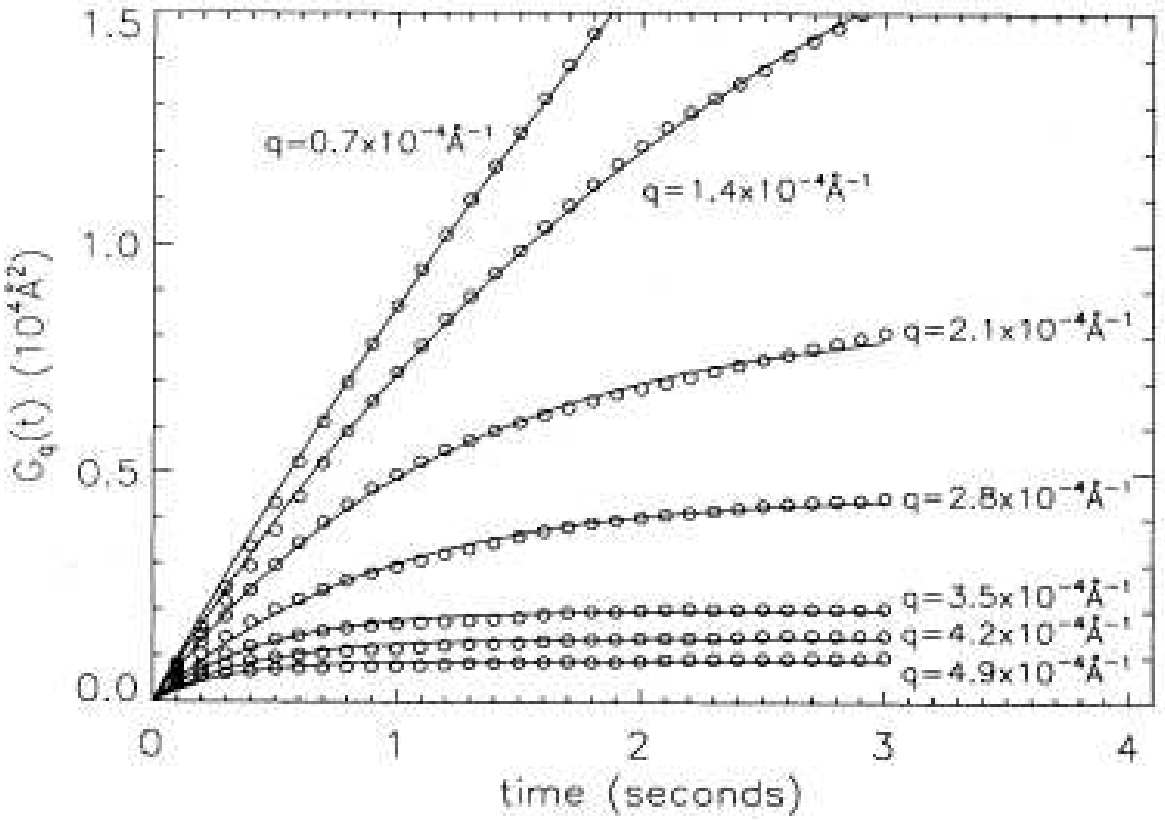
Bartelt et al., Phys. Rev. B **48** (1993) 15453



- relaxation time $\tau(q) \sim q^{-2}$

Brownian motion of steps on Si(111)

Bartelt et al., Phys. Rev. B **48** (1993) 15453



- Long-wavelength modes relax slowly