Since all available experimental evidence agrees quantitatively with these analogies, it is reasonable to guess that they may be correct and exact [1]. This is unproven, and it may be wrong, but it has nontrivial and experimentally verifiable ramifications.

The first of these is that the transition between the Quantum Hall states $0 \to 1/3$ should be the "same" as that between the states $0 \to 1$. There is now considerable evidence that in the absence of coulomb interactions, this transition is described by the renormalization group flows shown in Fig. 1 [8,9]. Several comments are in order. One interprets this diagram physically the same way one interprets the one-dimensional flows of the ordinary scaling theory of localization. When the sample is small, localization does not occur, and the conductivities take on their "mean field" values $\sigma_{xx}^{(o)}$ and $\sigma_{xy}^{(o)}$, given by

$$\sigma_{xx}^{(o)} = \frac{\rho\varepsilon e^2\tau}{m} \frac{1}{H_o(\omega_c\tau)^2} \tag{1}$$

and

$$\sigma_{xy}^{(o)} = \frac{nec}{H_o} - \frac{\sigma_{xx}^{(o)}}{\omega_c\tau} \tag{2}$$

where ρ is the Fermi surface density of states, ε is the Fermi energy, n is the electron density, and τ is a suitable elastic collsion time. It is helpful to think of the mean field values in the low-disorder limit, when $\sigma_{xy}^{(o)}$ represents the electron density and $\sigma_{xx}^{(o)}$ represents the amount of disorder. As the sample is imagined to be made bigger, the conductivities evolve along the flow lines, and converge to the quantum Hall values for very large samples. The fixed point in the diagram corresponds physically to the phase transition in which the Hall conductance jumps discontinuously from 0 to 1 as the Fermi level ($\sigma_{xy}^{(o)}$) is raised through a narrow band of extended states. The β-function for this flow has actually been calculated