MANIFOLD-DRIVEN SPIRAL STRUCTURE

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I will present and discuss the manifold (or manifold flux-tube) theory, which can explain the formation and properties of both spirals and inner and outer rings in barred galaxies using a common framework. Its building blocks are the invariant manifolds associated to the saddle unstable Lagrangian points of the bar. It explains why the vast majority of spirals in barred galaxies are two armed and trailing and what it takes for higher multiplicity arms to form. The shapes of spirals and of rings that this theory predicts are in agreement with observations. It predicts that stronger non-axisymmetric forcings – as measured at and somewhat beyond corotation – will drive more open spirals. I will show examples of manifold-driven spirals from my simulations and will extend this theory to applications other than barred galaxies.