Abstract Submitted
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Black Hole Growth Excites Spin THOMAS POPE, JOHN BLONDIN, North Carolina State University — An x-ray telescope reveals hundreds of thousands of x-ray sources invisible to our eyes. These objects are powered by accretion. The theory of hydrodynamic accretion was first described 70 years ago by Hoyle and Lyttleton (1939), and has become a fundamental building block for understanding compact x-ray sources. Modern research on gravitational accretion has focused on the use of numerical simulations to study the stability of accretion and the possibility of accretion of angular momentum, which does not exist in the steady- state theory of Hoyle and Lyttleton. After 20 years there is still no consensus on the stability of such. We have addressed this confusion by using high- fidelity numerical simulations run on the NSF's 'Ranger' supercomputer. By starting from an initially steady-state axisymmetric solution we are now able to show that Hoyle-Lyttleton accretion is unstable to small perturbations. We use these simulations to quantify the growth rate and oscillation period of the unstable accretion shock. Provided the star is sufficiently small, the secular evolution is described by sudden jumps between states with counter rotating semi-Keplerian accretion disks feeding the star with a specific angular momentum comparable to a Keplerian orbit at the surface of the star.

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