follows the coalescence of two holes, it is worth estimating timescales of dynamical evolution of such systems in various situations. The rapid decrease of accretion rate was recently suggested by Park and Vishniac and, if it is true, the lifetime of the system can be extended significantly. This suggests a possibility that, at least, few of the coalescences can occur in nearby galactic nuclei.

Setting Limits on q_0 from Gravitational Lensing

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We consider gravitational lensing by galaxies in a wide variety of cosmological models. We model galaxies (with their heavy halos) as singular isothermal spheres. As the QSO approaches the antipode, which can occur in models with large values of cosmological constant Λ, the cross sections for lensing blow up. For a QSO beyond the antipode we can obtain an overfocused case. In this case, when a lensing event occurs, only one arbitrary dim image coincident with the position of the lensing galaxy nucleus is seen. If galaxy rotation curves are always flat or slowly rising, as appears to be the case for most galaxies, the overfocused case ***always produces one image.*** The existence of the apparently normally lensed case QSO 2016 with $z_Q=3.27$ and $z_L=1.01$ indicates that the antipodal redshift z_P is greater than 3.27. The seven observed lensing cases taken together, as well as the fact that no large separation galactic lenses have been found $z_P>3.27$, implying that $q_0>-2.3$.

Black Holes or Dark Clusters in M31 and M32?

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Recent spectroscopic data and dynamical modeling indicate the presence of dark matter within the nuclei of of M31 and M32. If these nuclei do not contain massive black holes, the most likely alternative form for the dark matter is a cluster of low-mass stars or degenerate remnants. Here we show that simple physical considerations place lower limits $\sim 0.1''$ on the half-mass radii of such clusters if they have survived in their present form over much of the age of the universe. Therefore, Space Telescope observations should rule out such clusters, or resolve them.

Dynamical Model Calculation of the Spherical Galaxy Having Massive Halo

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Using the schwarschild's linear programming technique, we obtained the general solution of the collisionless Boltzmann equation describing the spherical galaxy in the dynamical equilibrium state. From this calcution we have confirmed the existence of isotropic stellar systems which include dark halo. The flattening of the velocity dispersions in elliptial galaxies can be explained