

Constraining the Braneworld with Gravitational Wave Observations

Some braneworld models may have observable consequences that, if detected, would validate a requisite element of string theory. In the infinite Randall-Sundrum model (RS2), the AdS radius of curvature, L , of the extra dimension supports a single bound state of the massless graviton on the brane, thereby reproducing Newtonian gravity in the weak-field limit. However, using the AdS/CFT correspondence, it has been suggested that one possible consequence of RS2 is an enormous increase in Hawking radiation emitted by black holes. We utilize this possibility to derive two novel methods for constraining L via gravitational wave measurements. We show that the EMRI event rate detected by LISA can constrain L at the ~ 1 micron level for optimal cases, while the observation of a single galactic black hole binary with LISA results in an optimal constraint of $L \leq 5$ microns.