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Binding of Small Black Holes to a Brane in Asymptotically Randall-Sundrum Spacetimes SCOTT FRASER, Cal Poly San Luis Obispo, DOUGLAS EARDLEY, Kavli Institute for Theoretical Physics, UC Santa Barbara — General relativity in five spacetime dimensions can be used to model our universe as a surface (brane) in an extra-dimensional bulk space. We study the binding of small black holes to a brane with positive brane tension and a mirror (orbifold) symmetry, in asymptotically Randall-Sundrum spacetimes. We find that a small black hole that is on the brane has a substantial gravitational binding energy, hence it is stable against escaping from the brane into the bulk. We also find that a new kind of static black hole can exist at a certain location in the bulk; this new black hole is unstable to falling either towards or away from the brane. These results are obtained from a variational principle based on a version of the first law of black hole mechanics.

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