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**Probing the existence of extra dimensions with gravitational-wave observations<sup>1</sup>**

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At the turn of the last millennium, higher-dimensional braneworld physics presented a possible solution to the hierarchy problem. Here, I describe gravitational wave (GW) signals in braneworld models that have been studied thus far. These include black hole quasi-normal modes and the stochastic GW background. I also examine the challenges that the novel aspects of these signals present to gravitational-wave astronomers, and the new physics that they might unravel.

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