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Universal bound states in confined geometries

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The dimensionality of a system can fundamentally impact the behavior of interacting quantum particles. As a general rule, particles are more likely to cluster and bind together when they are confined to a plane and their motion is restricted. However, attractively interacting bosons apparently defy this expectation: While three identical bosons in three dimensions can support an infinite tower of Efimov trimers, only two universal trimers exist in the two-dimensional case. In this talk, I will show how these two limits are connected by investigating the problem of three identical bosons confined by a harmonic potential along one direction. I find that the deepest bound Efimov trimer hybridizes with the two-dimensional trimers, yielding a superposition of trimer configurations that effectively involves tunneling through a short-range repulsive barrier. This suggest a way to use strong confinement to engineer more stable Efimov-like trimers, which have so far proved elusive.