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Efimov-driven phase transitions of the unitary Bose gas

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Initially predicted in nuclear physics, Efimov trimers are bound configurations of three quantum particles that fall apart when any one of them is removed. They open a window into a rich quantum world that has become the focus of intense experimental and theoretical research, as the region of unitary interactions, where Efimov trimers form, is now accessible in cold-atom experiments. We have used a path-integral Monte Carlo algorithm backed up by theoretical arguments to show that unitary bosons undergo a first-order phase transition from a normal gas to a superfluid Efimov liquid, bound by the same effects as Efimov trimers. A triple point separates these two phases and another superfluid phase, the conventional Bose-Einstein condensate, whose coexistence line with the Efimov liquid ends in a critical point. At the end of the talk, I discuss the prospects of observing the proposed phase transitions in cold-atom systems.