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Yang monopoles and emergent three-dimensional topological defects in interacting bosons YANGQIAN YAN, QI ZHOU, Purdue University — Yang monopole as a zero-dimensional topological defect has been well established in multiple fields in physics. However, it remains an intriguing question to understand interaction effects on Yang monopoles. Here, we show that collective motions of many interacting bosons give rise to exotic topological defects that are distinct from Yang monopoles seen by a single particle. Whereas interactions may distribute Yang monopoles in the parameter space or glue them to a single giant one of multiple charges, three-dimensional topological defects also arise from continuous manifolds of degenerate many-body eigenstates. Their projections in lower dimensions lead to knotted nodal lines and nodal rings. Our results suggest that ultracold bosonic atoms can be used to create emergent topological defects and directly measure topological invariant that are not easy to access in solids.

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