

# Creation of a Monopole in a Spinor Condensate

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The experimental formation of Bose-Einstein condensate by using all-optical methods [1] makes it possible to create multi-component condensates. These spinor condensates allow topological structures that cannot exist in single-component systems. One candidate for a new structure to be observed in a spinor BEC is a *monopole* [2] which is a point-like topological defect in a vector field. It is characterized by a unit vector that is radial in respect to some unique central point. In spinor condensates the vector quantity could be the local spin of the condensed atoms, but that is not the only option.

We propose [3] a method to create a monopole structure in a spin-1 spinor condensate by applying the basic methods used to create vortices and solitons experimentally in single-component condensates. We show, however, that by using a two-component structure for a monopole, we can simplify our proposed experimental approach and apply it also to ferromagnetic spinor condensates. We also discuss the observation and the dynamics of such a monopole structure, and note that the dynamics (see Figure 1) of the two-component monopole differs from the dynamics of the three-component monopole.

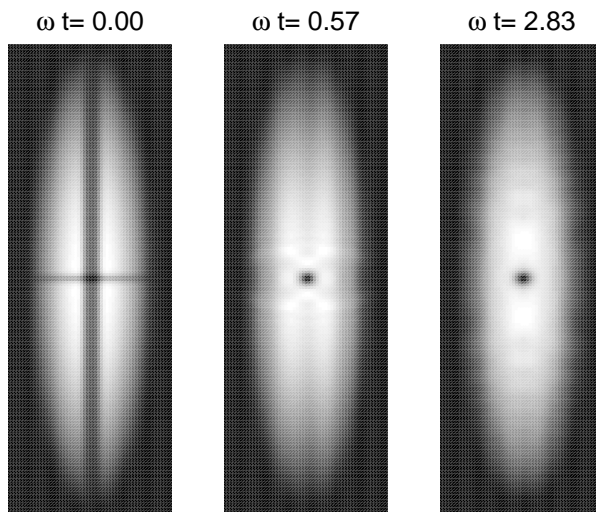


Figure 1: Time evolution of a monopole in a spinor condensate in a cigar-shaped trap

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