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Simple and efficient all-optical production of spinor condensates

JIE JIANG, LICHAO ZHAO, MICAH WEBB, YINGMEI LIU, Department of Physics, Oklahoma State University, Stillwater, OK 74078 — We present a simple and optimal experimental scheme for an all-optical production of a sodium spinor Bose-Einstein condensate (BEC). With this scheme, we demonstrate that the number of atoms in a pure BEC can be greatly boosted by a factor of 5 over some widely used schemes in a simple single-beam or crossed-beam optical trap. Our scheme avoids technical challenges associated with some all-optical BEC methods and may be applicable to other optically trappable atomic species. In addition, we discuss an upper limit for evaporative cooling efficiency in all-optical BEC approaches and a good agreement between our theoretical model and experimental data.

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