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No indirect increase in precision of energy measurements from nonlinearity in a two-well trap HAN CHEN, JUHA JAVANAINEN, U. of Connecticut — We study a two-well trap containing a Bose-Einstein condensate as a prototype for interferometric measurements of the energy difference of the atoms between the two sides of the trap. The measurement relies on a coupling to atom numbers, which implies the Heisenberg limit of precision. However, it is known that a nonlinear scheme, a measurement coupling proportional to a power of atom number higher than one, may defeat the Heisenberg limit. Here we ask if the nonlinear atom-atom interaction that couples to the dynamics of the system as a whole could indirectly increase the precision of energy measurements. Our numerical analysis indicates that it is not the case.

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