Coherent optical control of a single erbium center in GaN

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The erbium ion silicon has recently emerged as one of the potential candidates for quantum information processing thanks to its combination of atomic-line properties and solid-state host environment[1]. A hybrid approach has been demonstrated in which optical excitation is used to change the charge state of an erbium defect center in a silicon-based single-electron transistor, and this change is then detected electrically. The work is lacking of coherent measurements which is an important issue for the quantum information processing and, especially, a small-bandgap property of silicon. Here I propose an experimental approach to coherently controlling[2] of impurity wavefunctions associated with a single erbium optical center in GaN by the Zeeman effect.

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2. P. T. Greenland, S. A. Lynch, A. F. G. van der Meer, B. N. Murdin, C. R. Pidgeon, B. Redlich, N. Q. Vinh, and G. Aeppli, "Coherent Control of Rydberg States in Silicon", *Nature* **2010**, 465, 1057.