Progress in the Research on the Thermometry in Magnetic Fields

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Two temperature fixed points, triple point of water (273.16 K) and argon (83.8058 K), were developed to be used in magnetic fields. As their temperature values are not affected by magnetic fields, they serve as ideal tools to study the magnetic field effects on the various temperature sensors. For example, a correction function for a platinum resistance thermometer was proposed with a basis on the results at the triple point of water and its applicability was assessed by argon triple point to have an accuracy of 3%.

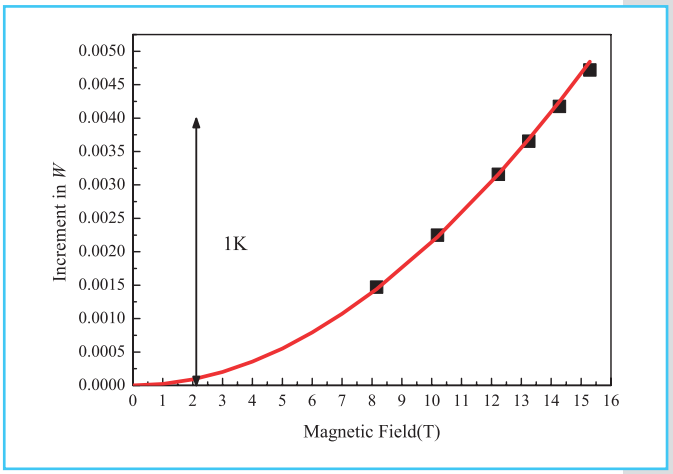

Fig. Assessment of the scaling rule for the magnetic field effect on a platinum resistance thermometer. The experimental results at argon triple point(■) agree with the predicted curve(—)determined by the data at the triple point of water.

Coherent control of molecular orientation by two-color laser fields

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We demonstrate molecular orientation by using phase-controlled two-color ω +2 ω laser pulses with an intensity of 1.0×10^{12} W/cm^2 and a pulse duration of 130 fs. This method performed well because (1) molecular orientation can be achieved by only optical fields; (2) the direction of orientation is easily switched by changing the sign of the quantum interference; and (3) this method is free from any resonance constraint and thus can be applied to any molecule.

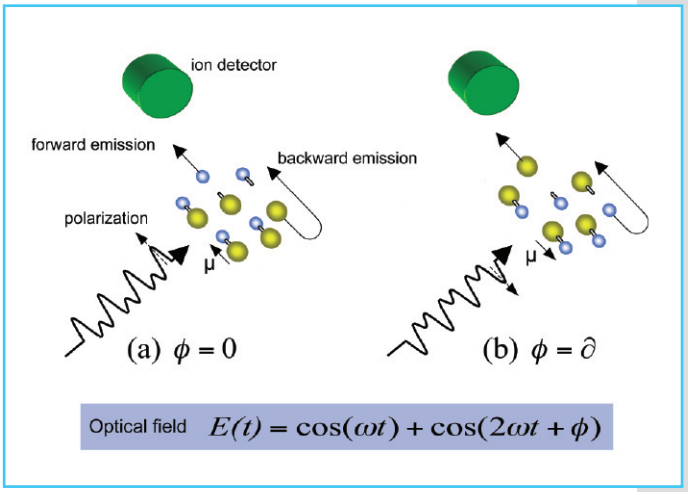

Fig. Method to observe molecular orientation induced by phase-controlled two-color ω +2 ω laser pulses.

The asymmetry of ω +2 ω field can discriminate between parallel and antiparallel configurations of polar molecules. The orientation of molecules can be monitored by the directional asymmetries of the photofragment angular distribution in dissociative ionization.