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Magnetic-field-assisted atomic polarization spectroscopy of ^{4}He SHENG LI, HAIDONG WANG, TENG WU, XIANG PENG, HONG GUO, Peking University, CREAM TEAM — Atomic polarization spectroscopy (PS) is a high resolution sub-Doppler atomic spectroscopic technique with free modulation. It is always desirable to obtain a PS signal with zero background as it can provide a more preferable laser frequency stabilization performance. There are many factors that can affect the PS signal background, i.e., the laser power, the laser polarization and the magnetic field. Here, we demonstrate a method for observing and analyzing the effects on the PS signal of ^{4}He under different magnetic fields. At the beginning, under nearly zero magnetic field, the large asymmetrical PS signal background has been observed and cannot be eliminated by only optically adjusting. Then, we find that the PS signal profile can be changed and controlled by varying the magnetic field with transverse or longitudinal direction and different intensity. The optimized PS signal with symmetrical dispersive profile and zero background is obtained when the magnetic field is chosen and controlled in the transverse direction and more than 20000nT intensity. Similar phenomenon cannot be observed under the longitudinal magnetic field. A theoretical model is also presented, which explains and agrees well with our experimental results.

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