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The phenomena of spin rotation and depolarization of high-energy particles in bent and straight crystals at FCC energies and the possibility to measure the anomalous magnetic moments of short-lived particles (charm and beauty baryons)

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The analysis shows that the phenomena of spin rotation and depolarization of high-energy particles in crystals at energies that will be available at FCC can be used to measure the anomalous magnetic moments of short-lived particles at such energies. It has also been demonstrated that for negatively-charged particles (e.g., beauty baryons), the phenomenon of spin depolarization in crystals is a promising tool allowing the anomalous magnetic moment measurements. Moreover it has been noted that the spin depolarization effect occurs for neutral particles incident at small angles to crystal axes (planes), and this opens the potential for magnetic moment measurements of such short-lived particles. Channeling of particles in either straight or bent crystals with polarized nuclei could be used for polarization or polarization analysis of high-energy particles, including neutral particles. Depolarization and spin rotation of that fraction of neutral particles which moves in the region of high concentration of nuclei can be defined by particle reactions in the crystal: if at a certain point the particle is scattered at a large angle, this means that it has undergone a collision, and hence it was in the vicinity of the nuclei. At high energies, particles move along a straight line. Particles moving between the planes do not undergo collisions, while those moving along the axis or a plane do.

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