Spin 16 Symposium

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COSY optics and spin tracking with Bmad

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The COOler SYnchrotron is at the forefront of precise spin dynamics. The facility can accelerate polarized protons at up to 3.7 GeV/c. Numerous specialized devices such as electron coolers, a stochastic cooler and more recently a superconducting solenoidal snake make this accelerator complex unique.

As new opportunities and challenges come into perspective of the facility, it calls in particular for new simulation tools. The Bmad library is a versatile and self contained accelerator simulation code for beam, spin and even photon dynamics. With methods ranging from particle tracking using a Runge-Kutta integrator to Taylor maps produced by the analytical description of a magnetic element, it can be applied to a wide variety of problems.

We will present the COSY machine in the context of polarized protons and deuteron operations. We will then discuss the specificities of the Bmad code applied to spin dynamics and to the COSY machine. Some of the latest simulations as well as experimental results will be discussed.