

## Contribution submission to the conference München 2019

**Optimization of the injection beam line at COSY** — ●BENAT ALBERDI<sup>1,2</sup>, JOERG PRETZ<sup>1,2</sup>, and CHRISTIAN WEIDEMANN<sup>1</sup> for the JEDI-Collaboration — <sup>1</sup>IKP FZ Juelich, Germany — <sup>2</sup>RWTH Aachen University, Germany

The Cooler Synchrotron (COSY) is a particle accelerator and storage ring operated by the Institute for Nuclear Physics (IKP) at Forschungszentrum Juelich. The facility provides polarized and unpolarized beam sources, a cyclotron, an injection beam line and the synchrotron itself, which besides many other features contains electron and stochastic cooling systems. The injection beam line of CoSy has been injecting 45 MeV proton and 75 MeV deuteron beams from the cyclotron into the ring since 1991. The optimization of the injection is done by hand and, therefore, the opportunity for improvement is substantial. Currently, a new approach is being developed in order to make this process of optimization automatic. The main objective is to rely on computational and machine learning methods to set the injection beam line parameters in order to achieve desirable results and match the synchrotron's properties such as its acceptance. We discuss the different necessary steps to reach this goal. The process includes a first analysis of the injection beam line lattice and the optimization of its sections using the Bmad software, the characterization of the beam in the injection beam line, the calculation of its main parameters and, finally, the identification and automatic optimization of the ones we are interested in.

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