



Contribution ID: 1680 Contribution code: TUPM070

Type: Poster Presentation

Kaon beam simulations employing conventional hadron beam concepts and the RF separation technique at the CERN M2 beamline for the future AMBER experiment

Tuesday, 9 May 2023 16:30 (2 hours)

The future AMBER experiment aims to measure the inner structure and the excitation spectra of kaons with a high intensity kaon beam at the CERN secondary beam line M2. One way to identify the small fraction of kaons in the available beam is tagging with the help of differential Cherenkov detectors (CEDARs), whose detection efficiency depends critically on the beam parallelism. In the framework of the Conventional Beams Working Group of the Physics Beyond Colliders Initiative at CERN, several possible improvements of the conventional beam optics have been studied, trying to achieve a better parallelism, investigating especially the reduction of multiple scattering. Additionally, with the aim of increasing the Kaon purity of the beam, a Radio-Frequency separation technique has been also studied. This method exploits the differences in velocity due to the particle mass in the beam, kicking out unwanted particles with the help of two RF cavities. The limitations posed by the beam line for intensity and purity will be presented along with preliminary results of the potential purity and intensity reach of the RF-separated beam. Finally, the RF-separated beam is compared with the conventional hadron beam in terms of potential physics reach.

Funding Agency

Footnotes

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Yes

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Session Classification: Tuesday Poster Session

Track Classification: MC4: Hadron Accelerators: MC4.A21: Secondary Beams