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Studies performed for the EHN2 Beamline at CERN for next generation muon beam experiments.

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In the context of the Physics Beyond Colliders Study, various new experiments have been proposed for the EHN2 beamline at the CERN North Area. The experiments include MUonE, NA64 μ and the successor to the COMPASS experiment, tentatively named AMBER. The AMBER collaboration proposes to build a QCD facility requiring conventional muon and hadron beams for runs up to 2024 in a first phase of the experiment. MUonE aims to measure the hadronic contribution to the vacuum polarization in context of the $(g\mu-2)$ anomaly with a setup longer than 40 m and a 160 GeV/c high intensity, low divergence muon beam. NA64 μ is a muon beam program for dark sector physics requiring a 100 - 160 GeV/c muon beam with a 15 m - 20 m long setup. All three experiments requested beam times up to 2024 with compelling physics programs, which required launching extensive studies for the integration, installations, beam optics and background estimations. In this paper the new test beam facility in EHN2 will be introduced where the proposed experiments aim to run, along with details of all the studies performed to check the feasibility of the runs, compatibility as well as the updated optics for these next generation muon beam experiments.

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