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## **Preclinical proton minibeam radiotherapy facility for small animal irradiation**

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Compared to classic proton therapy, proton minibeam radiation therapy (pMBT) further spares normal tissue. To fully study this potential with small animal experiments focused minibeam with a sigma of 50 micrometers, a beam current of 1 nA and approx. 4 cm Proton-range (water) is needed. We present a preclinical pMBT beamline concept based on the 68 MeV cyclotron of the Helmholtz-Zentrum Berlin (HZB). The beamline was designed in first-order using the beam dynamic code TRACE 3-D. The maximum beam energy is defined by a first degrader after the cyclotron. A second degrader placed close before the target further reduces the energy, forming a spread-out Bragg peak in the target. Along the beamline, various slits shape the transverse beam profiles. A high magnetic field gradient triplet lens focuses the beam on the target while scanning magnets rasterscan it over the target. A small animal radiation research platform (SARRP) is used for positioning and imaging of the target. This beamline concept fulfills all the basic needs for the planned small animal minibeam irradiation studies. The results will contribute to the construction of a preclinical pMBT facility for small animals at HZB.

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### **Footnotes**

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Yes

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