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Mixed carbon and helium ion beams for simultaneous heavy ion radiotherapy and radiography –recent advances and perspectives

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A mixed carbon/helium ion beam with a variable He percentage for heavy ion radiotherapy and radiography has been provided and investigated at GSI for a second time in order to continue the studies on this new mode of image guidance for carbon ion beam therapy.
The mixed 12C3+/4He+ ion beam out of CH4 and 4He was provided by the 14.5 GHz CAPRICE ECR ion source for the subsequent linac-synchrotron accelerator systems at GSI. During the beam times and prior checks at the ion source test bench, different ion source settings were compared in terms of ion beam currents, stability, C-to-He-fraction, and O4+-contamination quantified by optical spectral lines, mass spectra, and current measurements with a current transformer.
Finally, both ions were simultaneously accelerated to different energies above 200 MeV/u, extracted, and characterised in the biophysics cave.
This paper outlines some of the measurements obtained and some of the perspectives for future work on this topic.

Primary author: Dr GALONSKA, Michael (GSI Helmholtzzentrum für Schwerionenforschung GmbH)

Co-authors: ANDREEV, Aleksandr (GSI Helmholtzzentrum für Schwerionenforschung GmbH); GRAEFF, Christian (GSI Helmholtzzentrum für Schwerionenforschung GmbH); MAIMONE, Fabio (GSI Helmholtzzentrum für Schwerionenforschung GmbH); MÄDER, Jan (GSI Helmholtzzentrum für Schwerionenforschung GmbH); VOLZ, Lennart (GSI Helmholtzzentrum für Schwerionenforschung GmbH); LANG, Ralf (GSI Helmholtzzentrum für Schwerionenforschung GmbH); HOLLINGER, Ralph

Presenter: Dr GALONSKA, Michael (GSI Helmholtzzentrum für Schwerionenforschung GmbH)

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