within the irradiated breast [2]. The distribution of glandular dose for breast irradiation from a plurality of angles, as occurs in DBT, may be of large interest in scanner optimization as well as for developing suitable models for the evaluation of the cancer risk related to the X-ray exposure for non–homogeneous irradiation. For this reason, it is of interest to evaluate the level of homogeneity of the dose spread, via the assessment of 3D dose maps in breast models during a DBT scan.

This work aimed at evaluating, via Monte Carlo (MC) simulations and measurements using radiochromic films, the dose distribution within compressed layered breast phantoms during DBT scans. For this purpose, two phantoms were employed: a PMMA homogeneous phantom and a heterogeneous phantom simulating a 50% glandular breast. A series of pre-calibrated (vs free-in-air air kerma) film pieces were inserted between the phantom slices and the 3D dose maps were measured for a set of DBT scans on different commercial units, for different sample thicknesses, at various exposure technique factors. We developed an MC code based on GEANT4 toolkit ver. 10.00, simulating the clinical setup specifications, whose results have been compared to measurements.

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Abstract ID: 61 Validation of Geant4 nuclear reaction models for hadrontherapy and preliminary results with SMF and Blob

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Reliable nuclear fragmentation models are of utmost importance in hadrontherapy, where Monte Carlo (MC) simulations are used to compute the input parameters of the treatment planning software, to validate the deposited dose calculation, to evaluate the biological effectiveness of the radiation, to correlate the β^+ emitters production in the patient body with the delivered dose, and to allow a non-invasive treatment verification.

Despite of its large use, the models implemented in Geant4 have shown severe limitations in reproducing the measured secondaries yields in ions interaction below 100 MeV/A, in term of production rates, angular and energy distributions [1–3]. We will present a benchmark of the Geant4 models with double-differential cross section and angular distributions of the secondary fragments produced in the ^{12}C fragmentation at 62 MeV/A on thin carbon target, such a benchmark includes the recently implemented model INCL++ [4,5]. Moreover, we will present the preliminary results, obtained in simulating the same interaction, with SMF [6] and BLOB [7]. Both, SMF and BLOB are semiclassical one-body approaches to solve the Boltzmann-Langevin equation. They include an identical treatment of the mean-field propagation, on the basis of the same effective interaction, but they differ in the way fluctuations are included.

In particular, while SMF employs a Uehling-Uhlenbeck collision term and introduces fluctuations as projected on the density space, BLOB introduces fluctuations in full phase space through a modified collision term where nucleon-nucleon correlations are explicitly involved. Both of them, SMF and BLOB, have been developed to simulate the heavy ion interactions in the Fermi-energy regime. We will show their capabilities in describing ^{12}C fragmentation foreseen their implementation in Geant4.

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Abstract ID: 65 Dosimetry for treatment of retinoblastoma with external photon beams

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Retinoblastoma is the most common intraocular malignancy in the early childhood. Patients treated with external beam radiotherapy respond very well to the treatment. The University Hospital of Essen has successfully treated these patients on a daily basis during nearly 30 years using a dedicated "D"-shaped collimator inserted in the head of a Varian Clinac 2100 C/D operating at 6 MV. The collimator conforms a "D"-shaped off-axis field whose irradiated area can be either 5.2 or 3.1 cm^2. In this work, a dosimetric analysis of the technique has been carried out by using the Monte Carlo (MC) code PENELOPE.

Experimental depth dose distributions and lateral profiles were compared with those obtained with Monte Carlo and with the analytical anisotropic algorithm (AAA). PENELOPE simulations agree well with the experimental data with differences in the dose profiles