the MRL, as well as measurable paramagnetic changes observed using the 1.5 T MRI component of the MRL during and after irradiation. To our knowledge, this is the first time the dose accumulation inside a 3D dosimeter has been visualized in real-time during irradiation using the MRL. The results of this study warrant further investigations into the use of 3D dosimeters for the verification of patient specific radiation therapy treatment plans for the MRL.

PO-0801
Large area 2D polycrystalline CVD diamond dosimeter under intensity modulated beams
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Purpose or Objective: In radiotherapy, the development of bidimensional detectors with the suitable dosimetric features for pretreatment quality assurance of the new advanced treatment techniques is of interest. Diamond is a valid candidate as real-time dosimeter since, contrary to silicon, it is an almost tissue equivalent material showing in principle no energy dependence. Furthermore, it is possible to product large-area polycrystalline diamond wafers with suitable electronic properties. In this study we describe the performance of DIAPIX, a large area dosimeter used for pretreatment verification of intensity modulated treatment plans.

Material and Methods: The dosimeter is made of two detector-grade adjacent 2.5x2.5cm² polycrystalline Chemical Vapour Deposited (pCVD) diamond samples, each equipped with a 12x12 matrix of 144 contacts with a pitch of 2mm, connected to a custom-made electronic read-out system. Tests of the pCVD diamond dosimeter have been performed by means of an Elekta Synergy LINAC, with conventional photon beams, with clinical IMRT fields, from prostate and breast cancer, and with a VMAT lung treatments. The dosimeter was placed at the isocenter and sandwiched inside a phantom of water equivalent material. First set of measurements under a flat field and to obtain a flatness correction factor were acquired. Since the area of the prototype under study is smaller respect to a typical IMRT field, the dosimeter was aimed to verify the correct behavior of the whole matrix under a flat field and to obtain a flatness correction factor for each pixel were performed. Afterwards dosimetric maps for each pixel were acquired. Since the area of the prototype under study is smaller respect to a typical IMRT field, the dosimeter was positioned at the isocenter and then shifted in the Latero-Lateral direction. QA plans were computed on the phantom using the Treatment Planning System (TPS) Monaco v3.2., which uses a Monte Carlo algorithm to compute the dose distribution, with a dose grid of 2 mm, and Pinnacle v9.2 which uses a collapsed cone convolution respectively for the VMAT and IMRT plan.

Results: A comparison between the measured maps and the ones predicted by the TPS was performed. As an example, in fig 1 is reported the map collected of lung VMAT plan and the comparison between the measured profiles of some pixels and the ones calculated by Monaco TPS. Dose differences with TPS are in general within 5%, apart in the penumbra region where the dose gradient is high and where the distance-to-agreement is within 3mm.

Conclusion: Dose profiles compare favorably with TPS both for IMRT and VMAT. These results demonstrate that the pCVD diamond device is a suitable detector for dosimetric pre-treatment verification analysis in modulated radiation therapy and for conformal beams. This allows for the development of a large area monolithic device with high spatial resolution. In a next future, three samples will be put together in order to realize a matrix with 432 pixels with a total area of 7.5x2.5 cm². This work has been supported by the experiments INFN CSN5 DIAPIX and IRPT/MUR.

Poster: Physics track: Dose measurement and dose calculation

PO-0802
Monte-Carlo based validation of accelerator beam base data measurements
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Purpose or Objective: The quality of beam base data (BBD) is crucial for the accuracy of dose computation, because every measurement error translates into a systematic dose computation error. Despite elaborate guidelines and recommendations, the quality of BBD measurements cannot be verified directly. This constitutes a gap in the clinical QA chain. We present a Monte-Carlo (MC) based method to validate the self-consistency and overall quality of typical BBD measurements.

Material and Methods: BBD are naturally not independent; therefore, self-consistency is a sensitive indicator. Ideally, a full MC simulation, starting with the primary electron beam, would allow benchmarking of individual measurements. This requires that the electron beam properties are known, which can in turn only be determined indirectly from measurements of the photon fields, resulting in a circular problem; not to mention that full linac simulations with a final uncertainty fit for this purpose still require a long time. Thus, we propose: for each accelerator type, a number of electron beam tunes are simulated with BEAMnrc and the phase spaces recorded. The phase spaces are then decomposed into 5 sources and each source is described by a parametric model. The model parameters are naturally highly correlated and yield a unique parameter fingerprint of the beam tune. Given that the photon dose distribution of each source is known, the model parameters of a BBD set can be derived by a fitting process. If a parameter fingerprint of a measurement does not follow...