# AbstractID: 1243 Title: Automatic beam angles selection for IMRT planning with orientation constraints

Automatic selection of suitable beam angles in intensity-modulated radiation therapy (IMRT) has gained increasing attentions in recent years. There are mainly two issues limiting its wide practice in clinical plan: (1) extensive computation time is always needed, and (2) plentiful experiences of human planners in designing plans are neglected and can not be used to help the computer in optimization. In this work a useful tool is provided to overcome these two shortcomings. Using a graphical user interface (GUI), planners can define those orientations that beams are unwanted to pass through according to their experience. Then the left orientations space will be sampled into discrete angle candidates with a specified angle step. During the optimization the beam angles are selected using genetic algorithm (GA) and the intensity maps of the selected beams are optimized using conjugate gradient (CG) method. By doing so, not only the computation time can be reduced extremely because of the less searching space by eliminating those unwanted orientations, but also the valuable experiences accumulated by physicists and oncologists over time can be utilized in the optimization, which can guarantee the final optimized beam angles at least not worse than those designed by human planner. Finally, two simulated cases with obvious optimal beam angles and a more complex case with prostate tumor are employed to test the efficiency of our method. The results show that the presented method is valid and efficient and can act as a very useful tool in clinical IMRT planning.