

WEEKLY CALENDAR

January 21 - 25, 2013

DEPARTMENTAL COLLOQUIUM

"4D Optimization for Scanned Ion Beam Therapy of Moving Tumors"

3:30 PM, January 24, 2013
109 Nicholson Hall

John Eley
University of Texas M.D. Anderson Cancer Center

Host: Wayne Newhauser

• *Refreshments served at 3:10 PM in 232 (Library) Nicholson Hall* •

Scanned ion beam therapy provides highly conformal tumor dose coverage, due to the physical energy loss characteristics of ion beams in matter. Motion compensation approaches are needed to mitigate interference between organ motion and dynamic beam delivery, which can lead to deterioration of the tumor dose coverage. The purpose of the current work was to determine whether 4D optimization for scanned ion beam tracking therapy could improve target dose coverage and reduce dose to critical structures for moving tumors. A conjugate gradient minimization algorithm was developed to incorporate 4D organ motion data in the optimization of scanned ion pencil beam particle numbers. For a sphere target volume moving in water near a static avoidance volume, 4D optimized beam tracking reduced dose to the avoidance volume, compared to an existing 3D optimized tracking method, while achieving similar target dose coverage. Treatment planning studies for lung cancer patients demonstrated improved target dose uniformity using 4D optimized beam tracking instead of 3D optimized beam tracking. A 4D treatment control system capable of delivering this new therapy has been implemented for a synchrotron accelerator at the GSI Center for Heavy Ion Research in Darmstadt, Germany.

ANNOUNCEMENT:

The University will be closed on Monday, January 21, 2013 due to the Martin Luther King, Jr., Holiday. Classes will resume on Tuesday, January 22, 2013 at 7:30 am.

PUBLICATIONS:

1. "U(N) and holomorphic methods for LQG and Spin Foams", Enrique F. Borja, **Jacobo Diaz-Polo**, and Inaki Garay, Proceedings of Science, (QGQS 2011) 024.