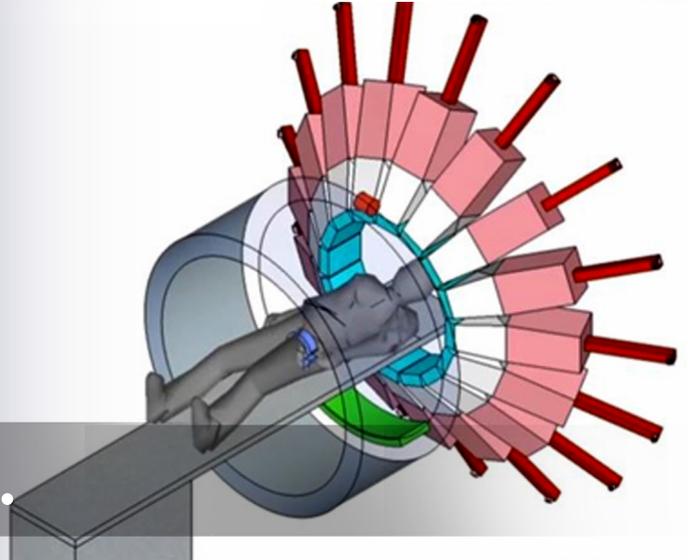# ΛNSYS® + TibaRay, Inc.

"We are designing and prototyping the next generation of Radiation Therapy Systems for the treatment of cancer – Pluridirectional High Energy Agile Scanning Electronic Radiotherapy (PHASER). PHASER takes advantage of the latest discoveries in accelerator science and advanced manufacturing techniques and will reduce treatment times to less than a second. ANSYS simulation codes are essential to convert the latest accelerator science discoveries into actual working prototypes in a reasonable time and with reasonable effort. Without the ANSYS Electromagnetic Suite, it would have been much more difficult to generate design for RF accelerators and components essential to the success of our PHASER concept. In addition, other ANSYS products such as HFSS are essential for the mechanical design of these systems"

Vinod Bharadwaj
CEO
TibaRay, Inc., Stanford, California, U.S.A.

TibaRay, Inc. uses ANSYS engineering solutions to design next-generation electron accelerators for radiation therapy and other applications
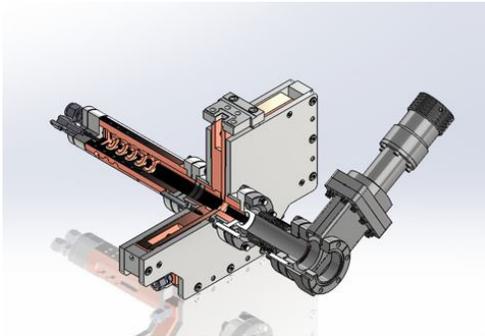
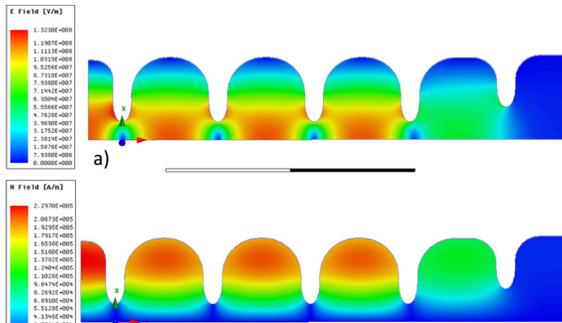Electron gun and mode launcher assembly for a 9.3 GHz photoinjector

Introduction

TibaRay is designing the next generation of Radiation Therapy (RT) systems for cancer treatment. The major challenges for existing RT systems are collateral damage to normal organs, the need for better accuracy/ focusing, motion control, cost and access, especially in the developing world. Our proposed product, PHASER, addresses these challenges and will be superior to existing systems. PHASER design would not be possible without detailed and accurate engineering simulations.

Calculated E-fields and H-fields in electron gun using ANSYS electromagnetic simulation code

Challenges

One of the challenges in existing RT systems is patient motion, which limits treatment accuracy. Although motion management is implemented in existing RT 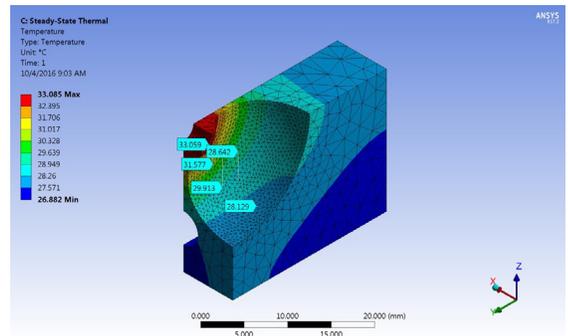systems to some extent, PHASER delivers the treatment dose so fast that the effects of motion are essentially eliminated. Electromagnetic and thermal simulations are essential for designing the novel RF components needed to achieve the necessary speed. ANSYS software has the capabilities needed for the new designs.

Technology Used

ANSYS® Electromagnetic Suite

ANSYS® HFSS™

ANSYS® Mechanical™
(simulations were done by TibaRay collaborators)

ANSYS® Fluent®

Engineering Solution

The ANSYS codes have been used to design radio frequency (RF) linear electron accelerators, RF windows, RF Phase Shifters and Power dividers. These will be essential in the final implementation of our PHASER RT system. It is essential for these components to be highly optimized and to be designed in a timely manner. Accuracy in design is critical. In addition, the components have to handle extremely high power levels.

Benefits

TibaRay is a recent startup with some limited contracts for customized components. Without ANSYS simulation codes we would not be able to fulfill our contracts with the reliability and accuracy needed in the time allotted. Use of ANSYS simulation provides a necessary revenue stream for future products. It is hard to understate the usefulness of the codes; we would simply not be in a position to benefit from any component contracts that we have won. We can use the software productively because TibaRay personnel are already familiar with ANSYS codes.

Thermal simulation of 1/8 cell using HFSS. Input to this simulation is the half-cell ANSYS e-m design

Company Description

TibaRay, Inc., is a recently incorporated company that plans to design, build and market the next generation of Radiation Therapy system for the treatment of cancer. The company founders are world-expert thought leaders in clinical radiation oncology, accelerator science, medical physics, imaging and RF systems. At present, we are in the process of raising capital to develop a full prototype for our PHASER RT system. If all goes well we will market our product in 3-5 years.

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