

## AbstractID: 14553 Title: IMRT and VMAT Inverse Planning with Compressed Sensing Techniques

The classical Shannon-Nyquist sampling theorem specifies that to avoid losing information when capturing a signal, one must sample at least two times faster than the signal bandwidth. In many medical applications, the Nyquist rate may be either impractical or too expensive to be realized practically. Compressed sensing provides a practically valuable approach for finding optimal solutions with under-sampled data. In this talk, I will summarize our recent work on using compressed sensing for IMRT and VMAT inverse planning. We show that effective utilization of prior knowledge of the systems through compressed sensing can greatly reduce the required number of measurement samples determined by the Shannon-Nyquist theorem and leads to significantly improved IMRT/VMAT plans. Compressed sensing has significant interactions and bearings on fields of radiation oncology and medical imaging. The learning objectives are:

1. Familiarize with the concept of compressed sensing.
2. Understand the fundamental limitations of currently available IMRT and VMAT inverse planning methods.
3. Appreciate the need for a compressed sensing based inverse planning.
4. Show the impact of the proposed new inverse planning algorithm.
5. Provide perspectives on future research topics.