

# **A dual-energy kV-MV CT device**

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A dual-energy kilovoltage (kV) and megavoltage (MV) computed tomographic (CT) imaging benchtop is developed for radiotherapy and imaging research. The purpose of this work is to demonstrate its function and use it for material analysis. The benchtop consists of a kV x-ray source, CT detector system, a rotating/translating/elevating stage, and a 6MV linear accelerator. The orientation of the radiation sources with respect to the detector allows for side-by-side use of kV and MV sources while using a single detector system. The use of a single detector system reduces cost and system complexity. The system is designed to use both sources during its operation. Since only one detector system is used, a convention is developed to assure the integrity of data from the respective radiation source. The benchtop is used to simulate a similar configuration where one source is continuous (e.g. radioactive). The kV and MV CT is used for material analysis. The MV CT provides a reliable measurement of electron density. The kV CT data contains both electron density and atomic number information. kV and MV data sets are used together to produce atomic number dependent images.