# Pylinac: A toolkit for performing TG-142 QA-related imaging tasks on a linear accelerator

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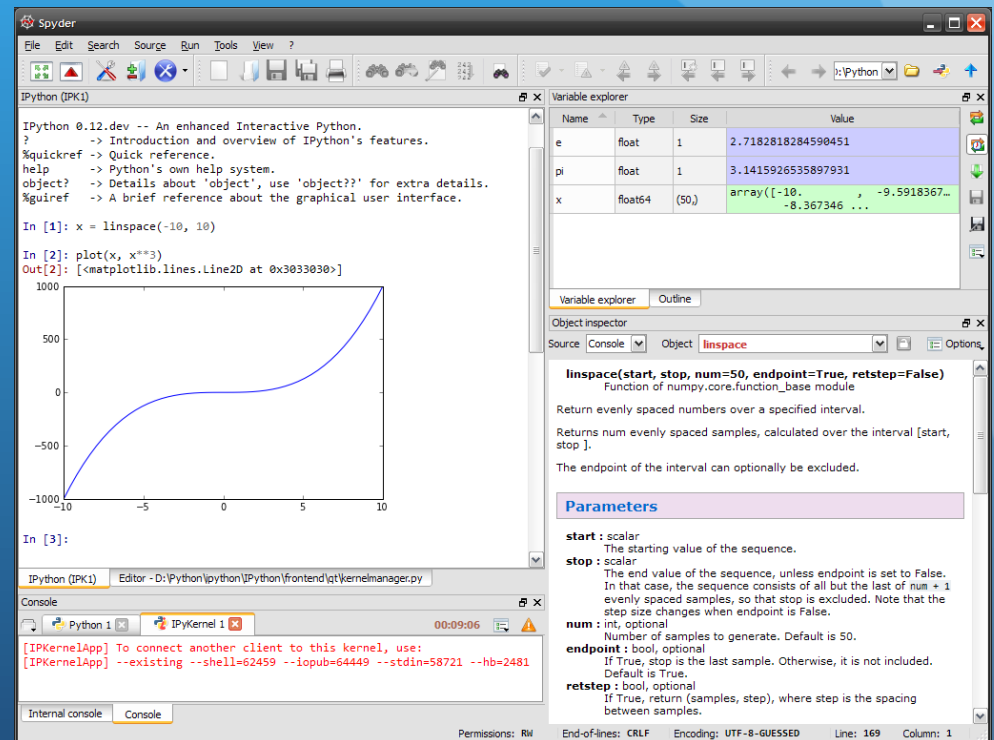**Corresponding Author:** a-zaila@psmmc.med.sa and MADILI@psmmc.med.sa

# Purpose

Python toolkit codes is designed to assist medical physicists to automate analysis of imaging quality assurance (QA) tests for the linear accelerator as required quantitatively following the recommendations of the AAPM TG-142 report.
It has eight modules examining different QA test.

# Methods

A minimal amount of code is required to run pylinac algorithms

The analyzing accomplished by including DICOM images into the required QA module.

# Results – Picket Fence Module

The module was used to verify the accuracy of MLC position against gantry position for Varian 2100 C/D.

The Module measures picket FWHM for all leaves at each stopping point in the pattern.
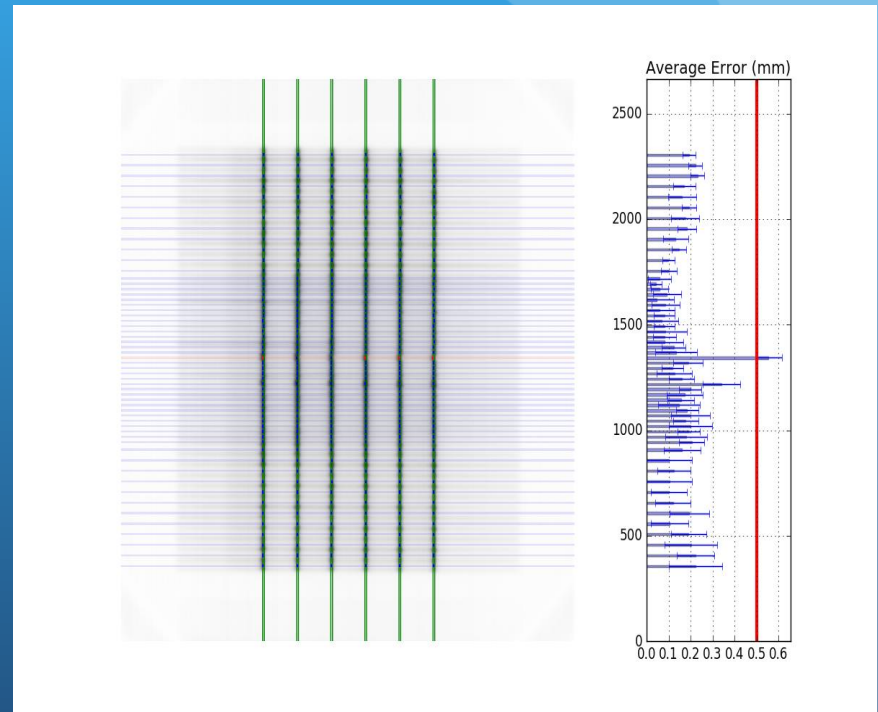
# Results – VMAT Module

The analysis is according to the Varian RapidArc QA tests and procedures, specifically the Dose-Rate & Gantry-Speed (DRGS) and Dose-Rate & MLC speed (DRMLC) tests.
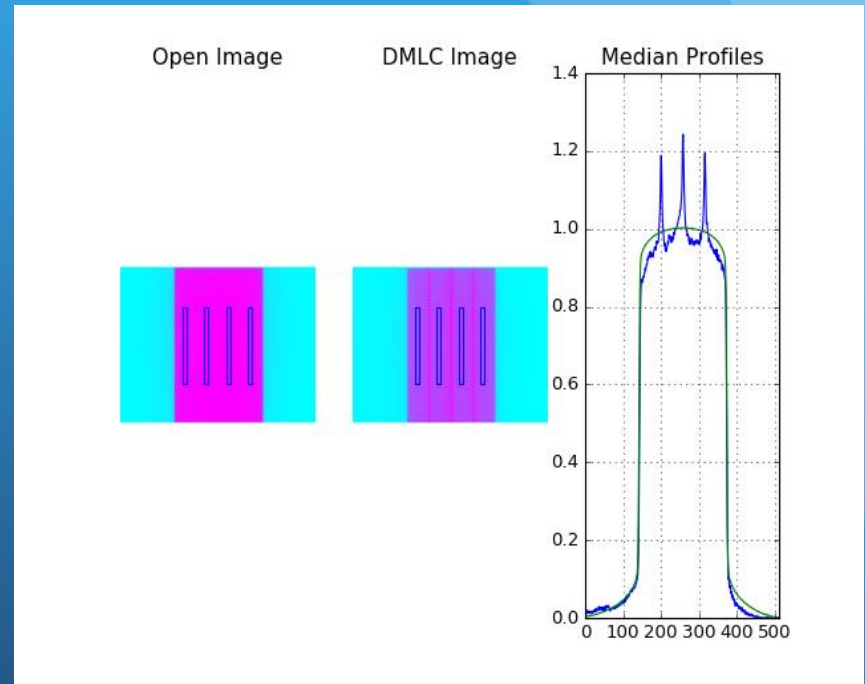
# Results – Starshot Module

The Starshot module analyses a Starshot image made of radiation spokes, whether gantry, collimator, MLC or couch.

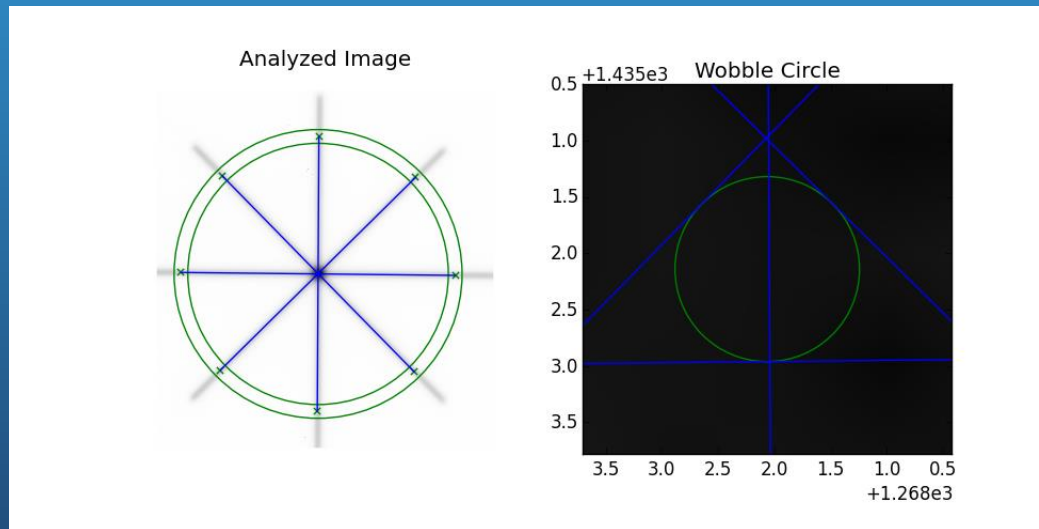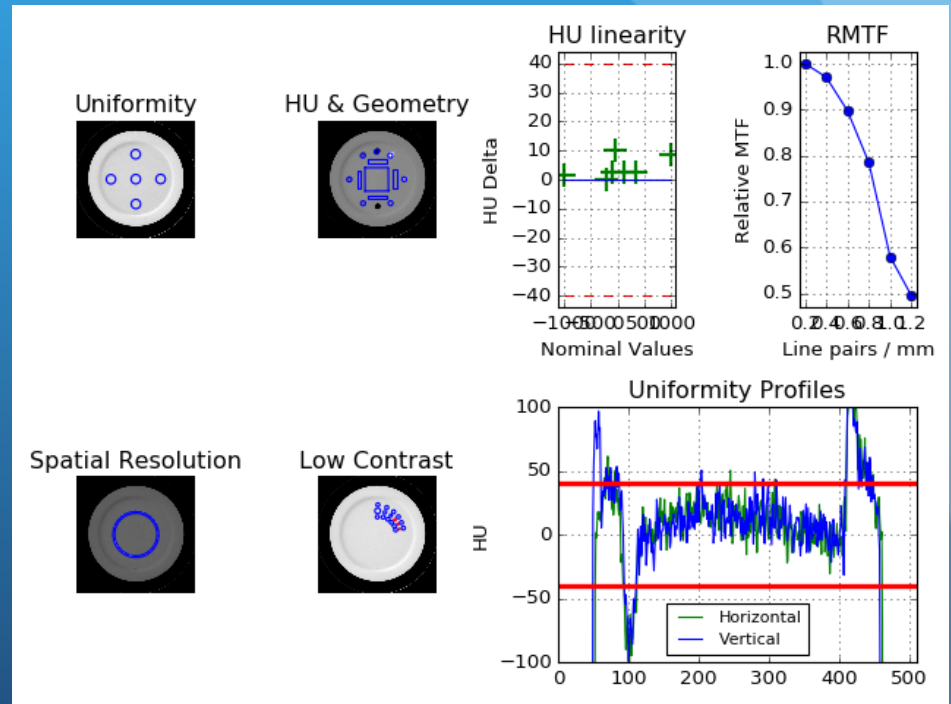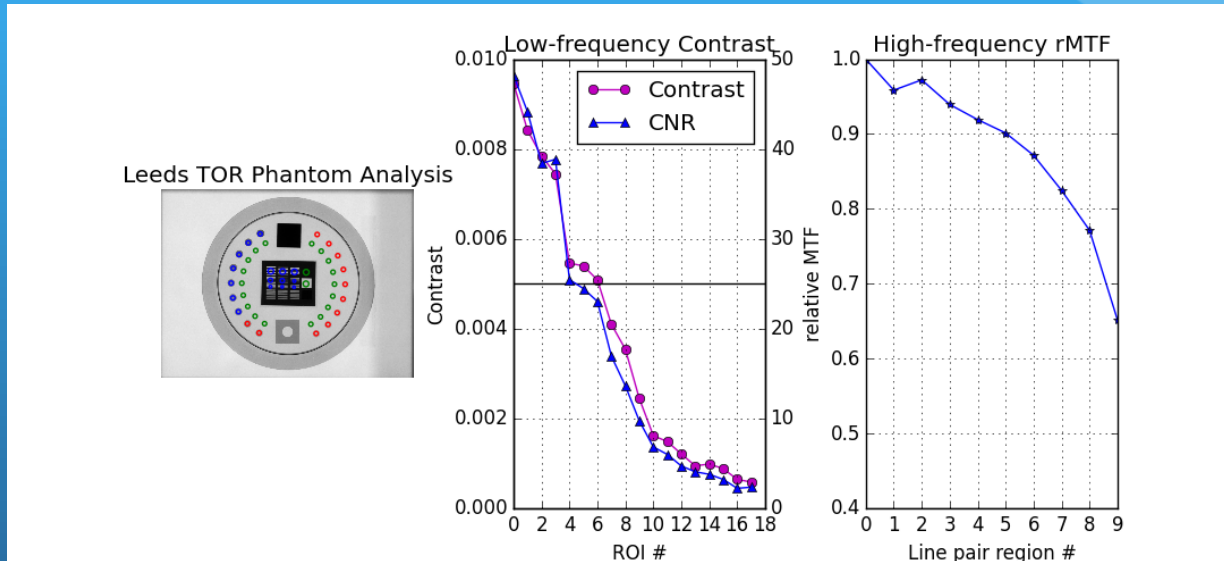# Results – CBCT Module

The CBCT module automatically analyzes DICOM images of a CatPhan 504 or 503 acquired when doing CBCT or regular CT quality assurance.

# Result – Planar Imaging module



The module analyzes phantom images taken with the kV or MV imager in 2D. The module uses MTF rather than subjective "How many line pairs can I see?". The results depend on many factors such as imaging technique (kV, mAs) and also the setup used during acquisition.

# Conclusion

Pylinac has been shown to be a versatile tool for each test and is carefully designed to fully address a required test of the TG-142 imaging tasks. However, some tests can give unreliable results if an Restriction  is violated.

# Acknowledgment

A TG-142 toolkit and web service for doing routine linear accelerator quality assurance https://assuranceqa.herokuapp.com