



Ray-tracing Arcus in Phase A

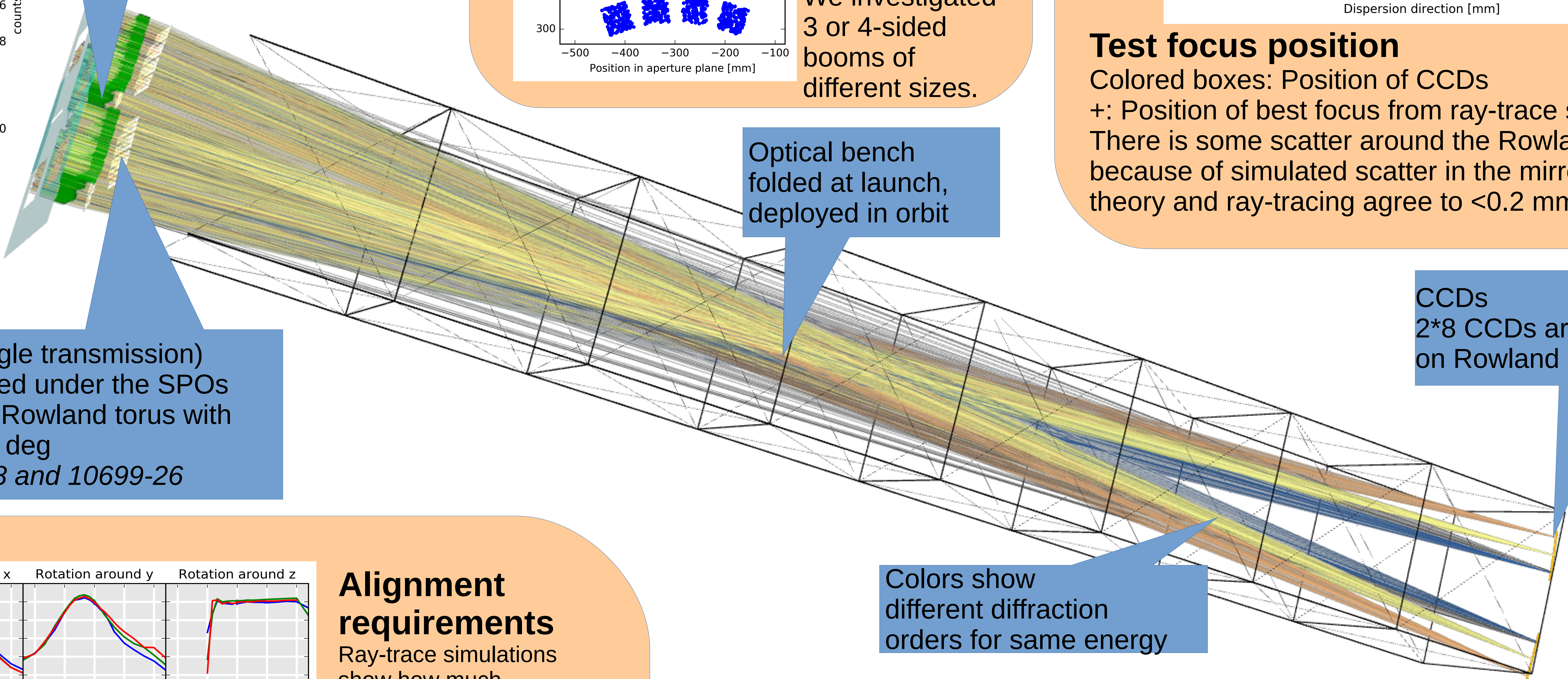
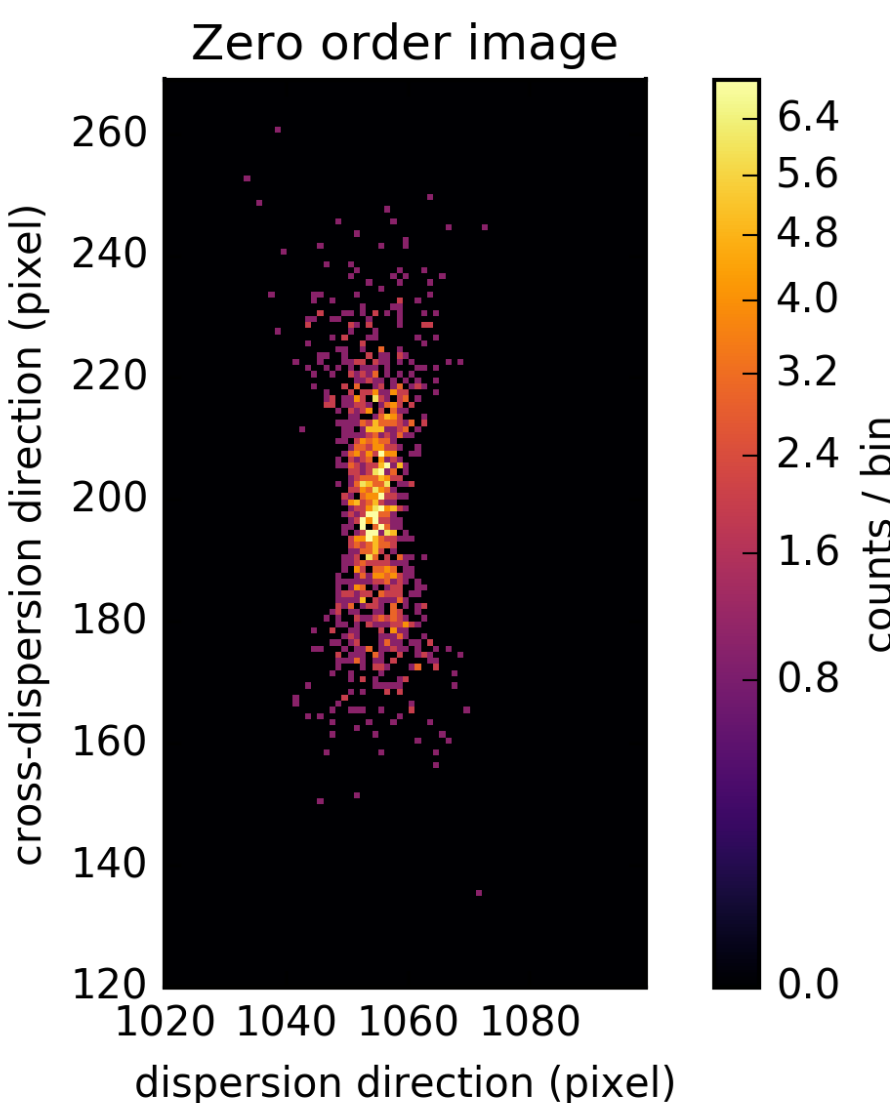
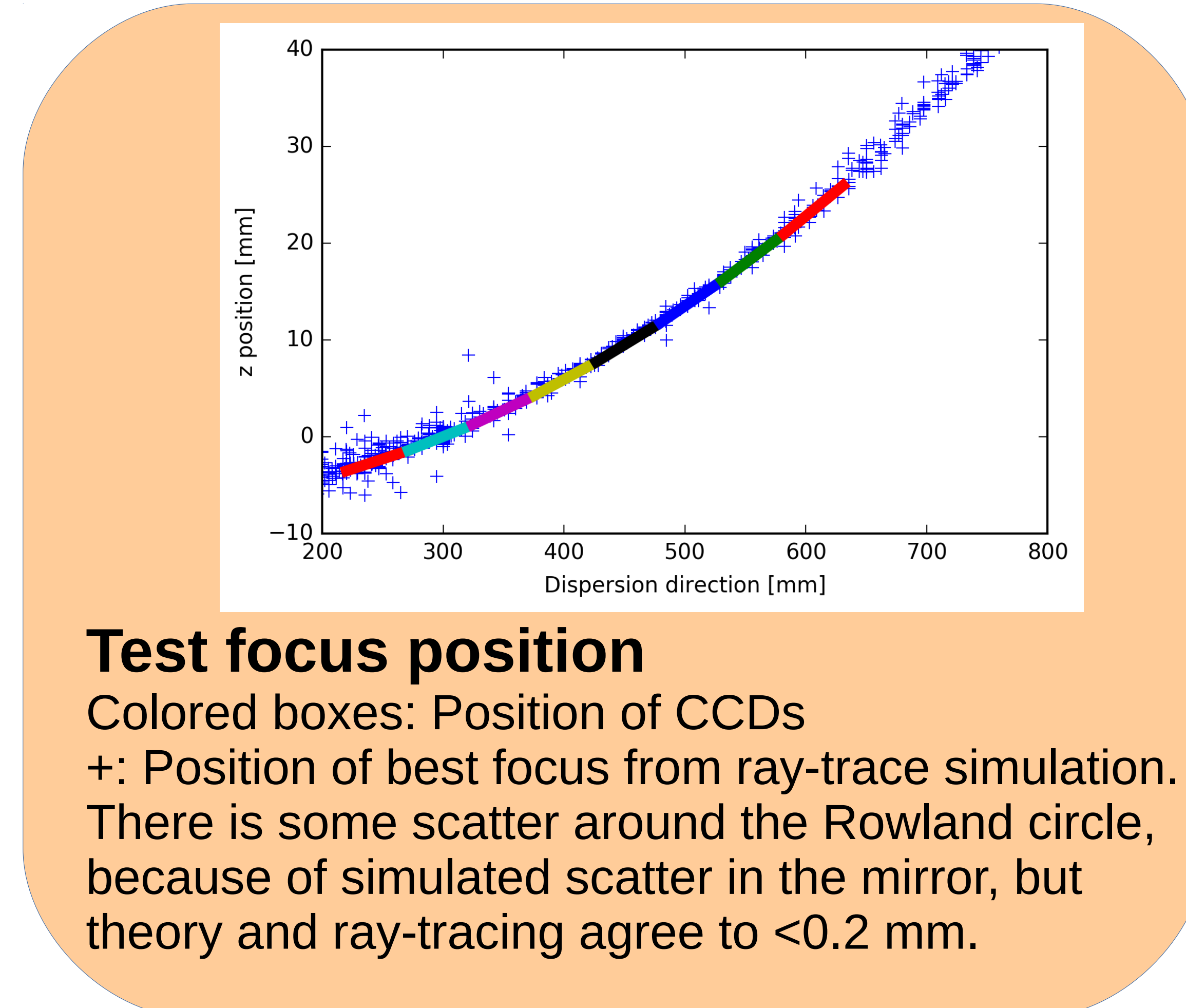
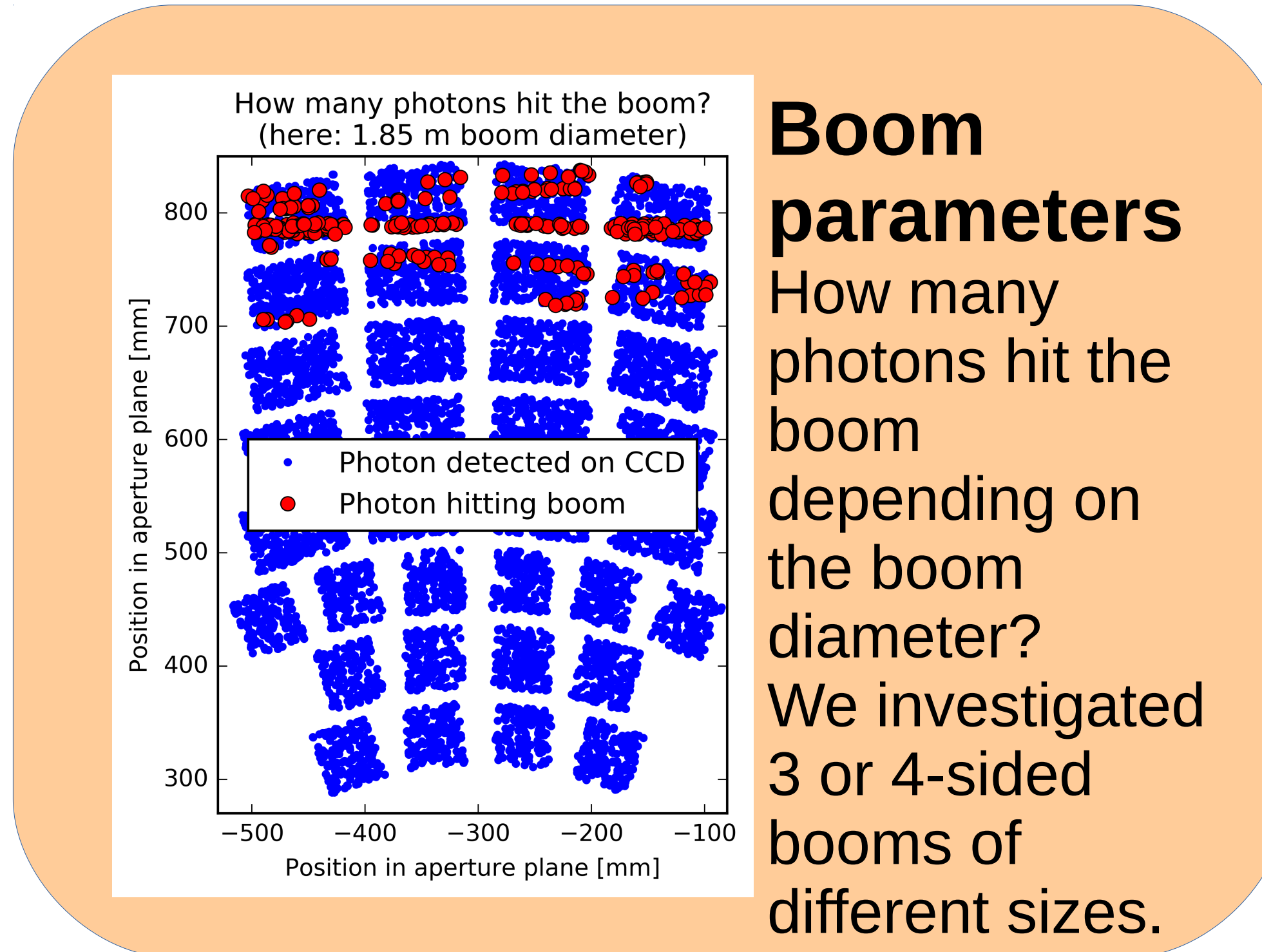


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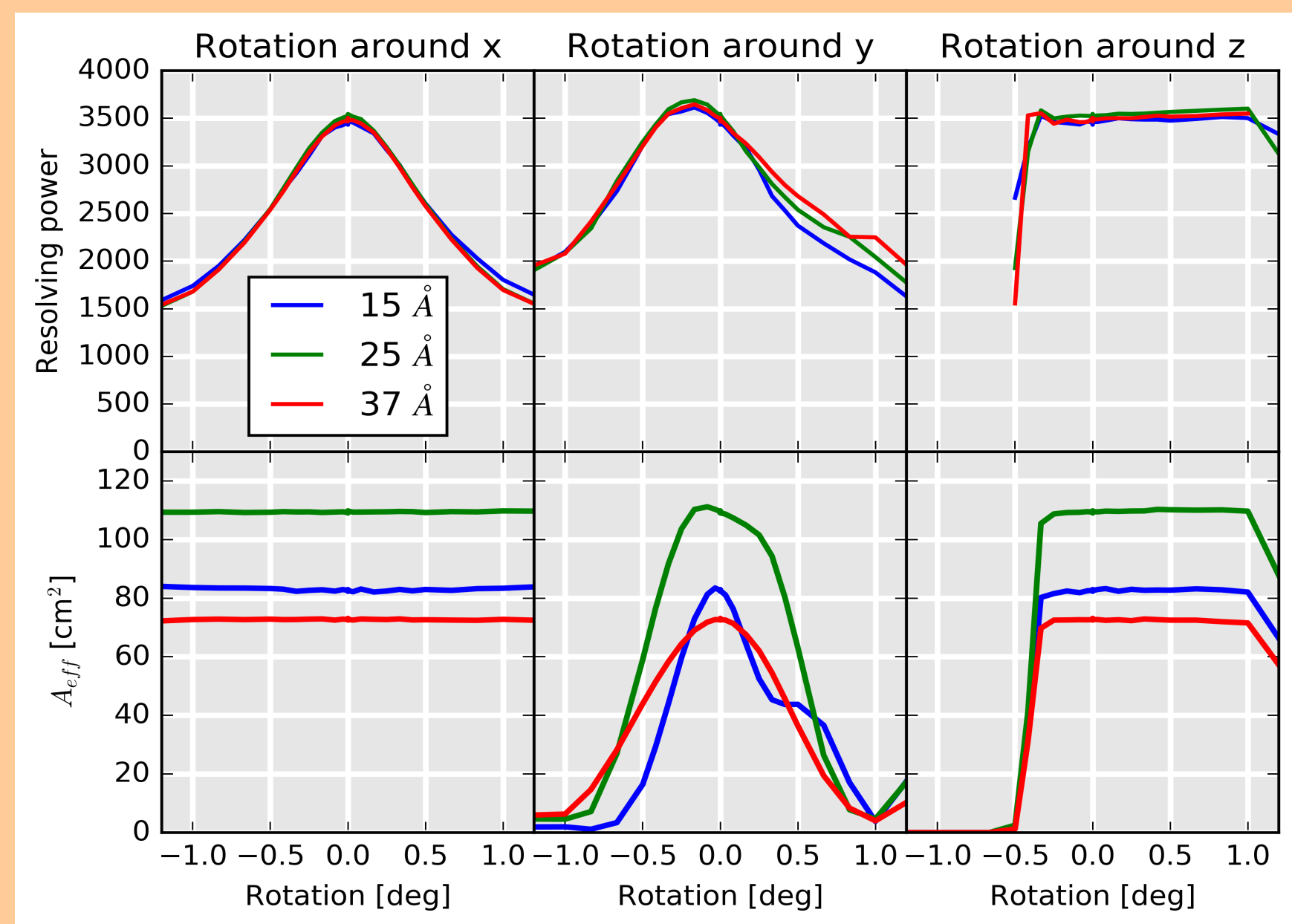
Arcus is a high-resolution X-ray grating spectrometer that was accepted for a Phase A study in 2017 in the NASA MidEx program. The optical design consists of four separate channels that are imaged on the same detector array. Many aspects of the optical layout were studied and improved using ray-tracing. We show some examples here.

See Paper 10699-77 (today 4:50 PM - 5:10 PM) for an overview of the Arcus mission.

Silicon pore-optics (SPO)
Each SPO has many stacked plates, forming pores
Developed for ATHENA, SPOs allow large area with low cost and weight



CAT (critical angle transmission) gratings arranged under the SPOs mounted along Rowland torus with blaze angle 1.8 deg
See: 10699-228 and 10699-26



Alignment requirements
Ray-trace simulations show how much effective area or spectral resolving power is lost if components are misaligned with respect to each other by translation in x,y,z or rotation around their center of mass in any axis so that an error budget for the mission can be set.
Top: Entire grating petal is misaligned with respect to SPOs (x: dispersion direction, y: cross-dispersion, z: optical axis).
Bottom: Individual gratings are misaligned within the grating petal.

