



EBL Basics: Spin, Contrast and Exposure Latitude Curves

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- Motivation
- Basics:
 - Spin Curve
 - Contrast Curve
 - Exposure Latitude
- Exposure Latitude and The Effective Process Blur
- Exposure Latitude + Pattern Density
- Summary



You've never done e-beam.

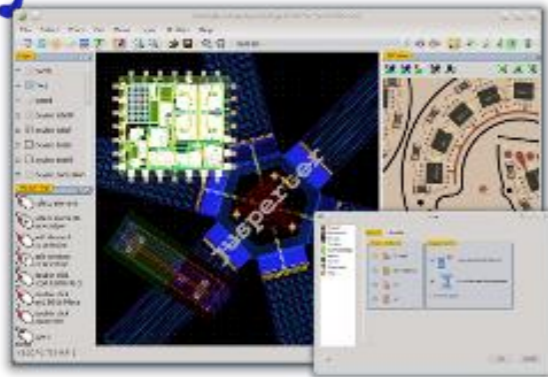
You've maybe done e-beam.

You've done e-beam but made it up as you went along.

I've been a grad student before.

CAD

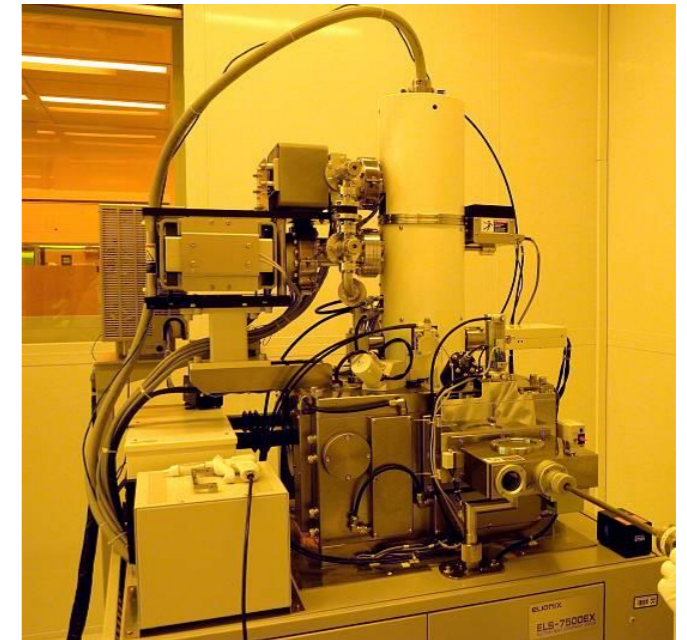
Layout Editor



Data Preparation



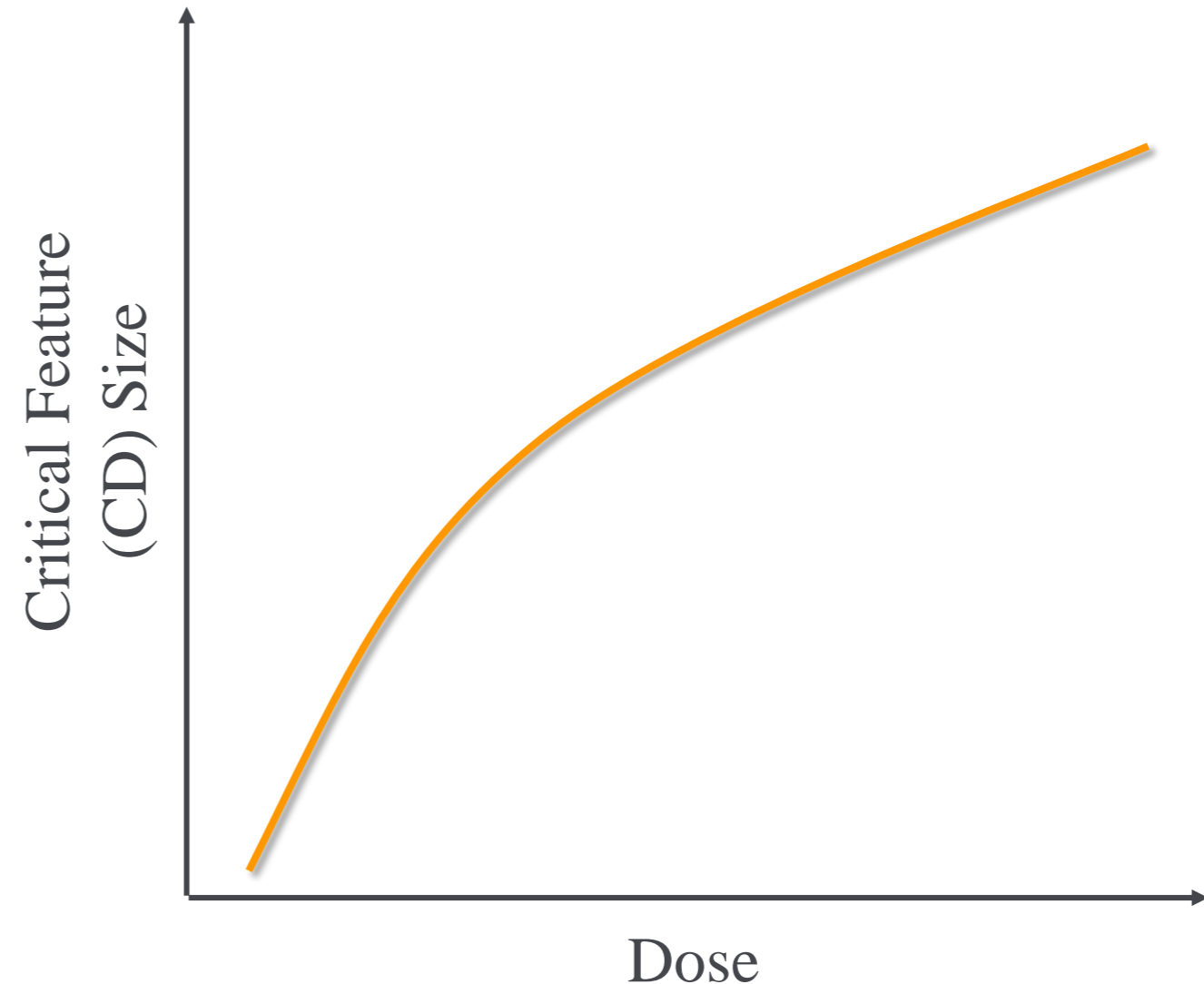
Tooling/Process





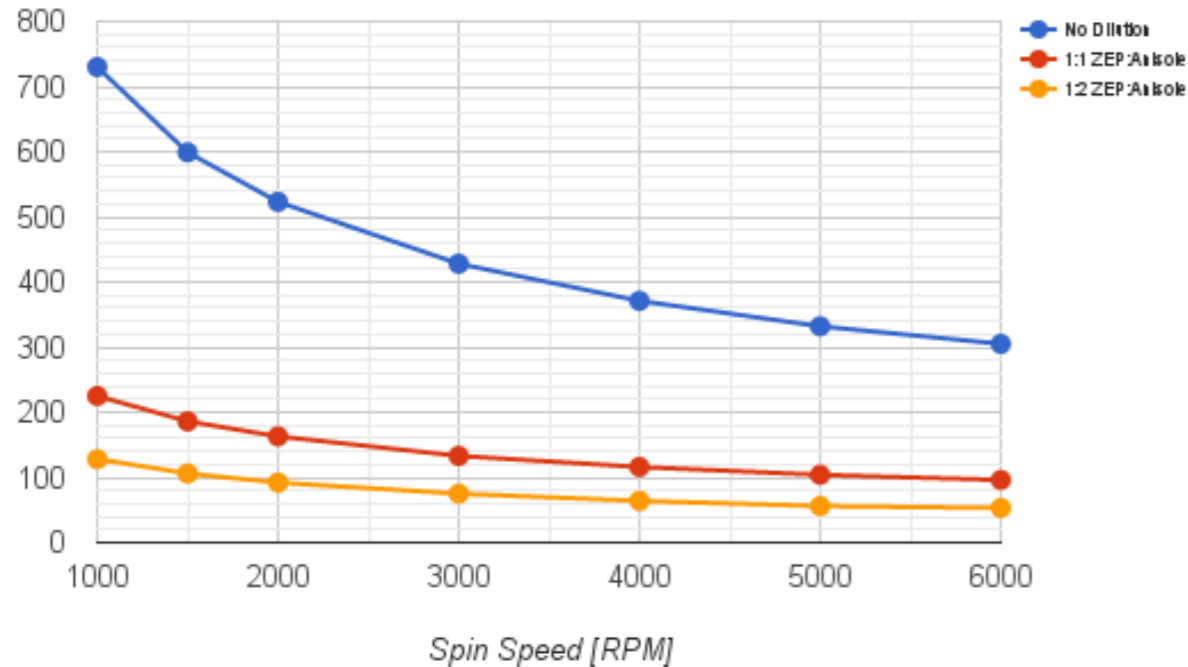
Process Characterization

- Spin Curve
 - Speed Dependent
 - Resist Dilution
- Contrast Curve
 - Developer Concentration
 - Developer Temperature
 - Development Time
- Exposure Latitude
 - Developer Concentration
 - Developer Temperature
 - Development Time



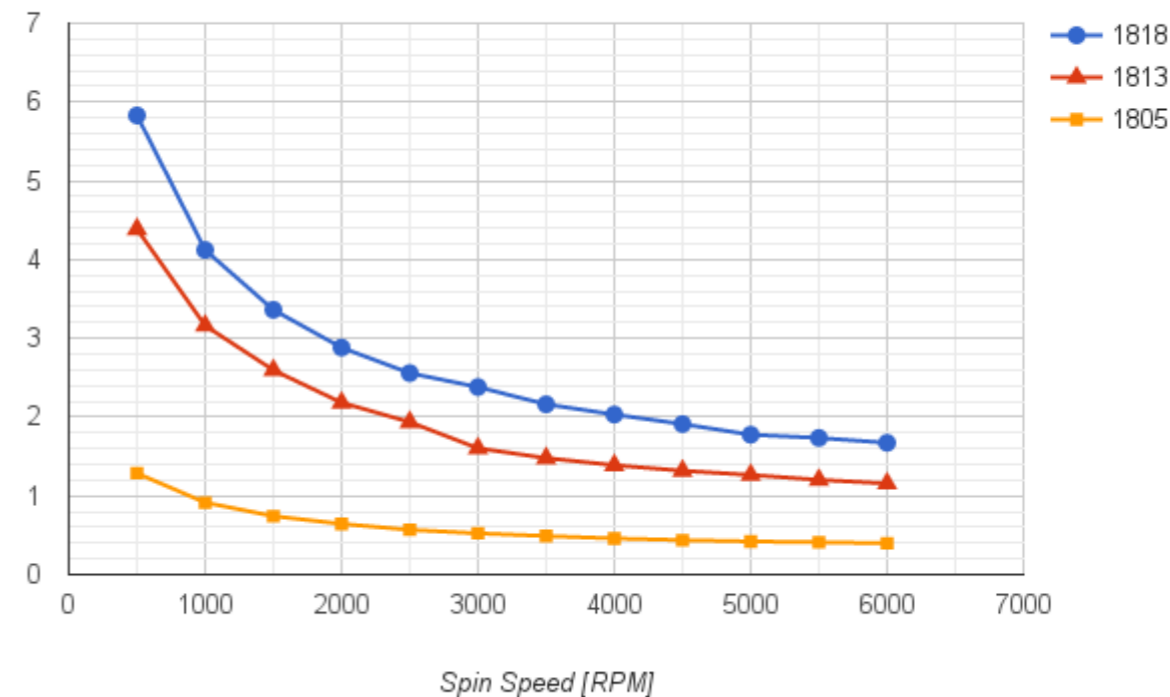
Electron Beam Lithography

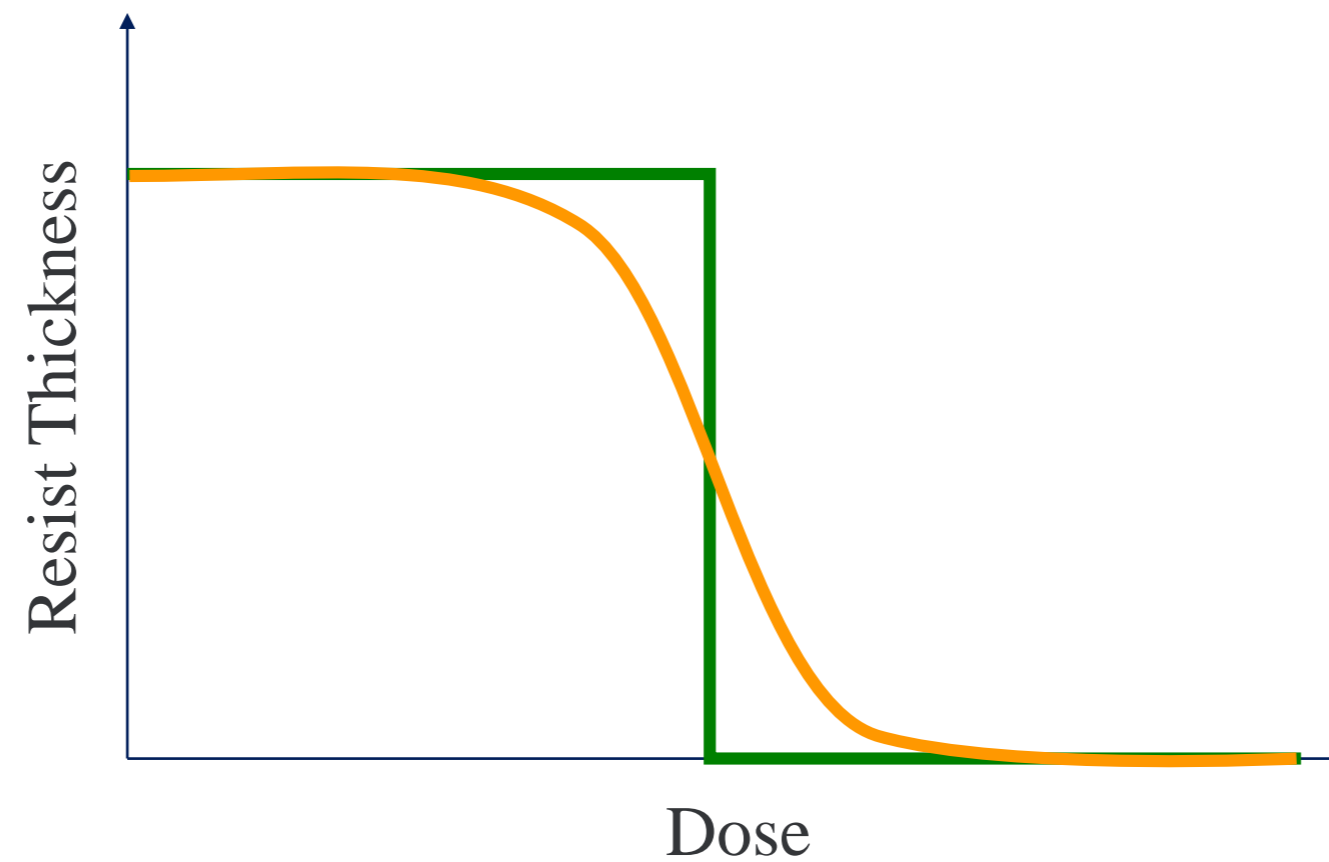
No Dilution, 1:1 ZEP:Anisole and 1:2 ZEP:Anisole

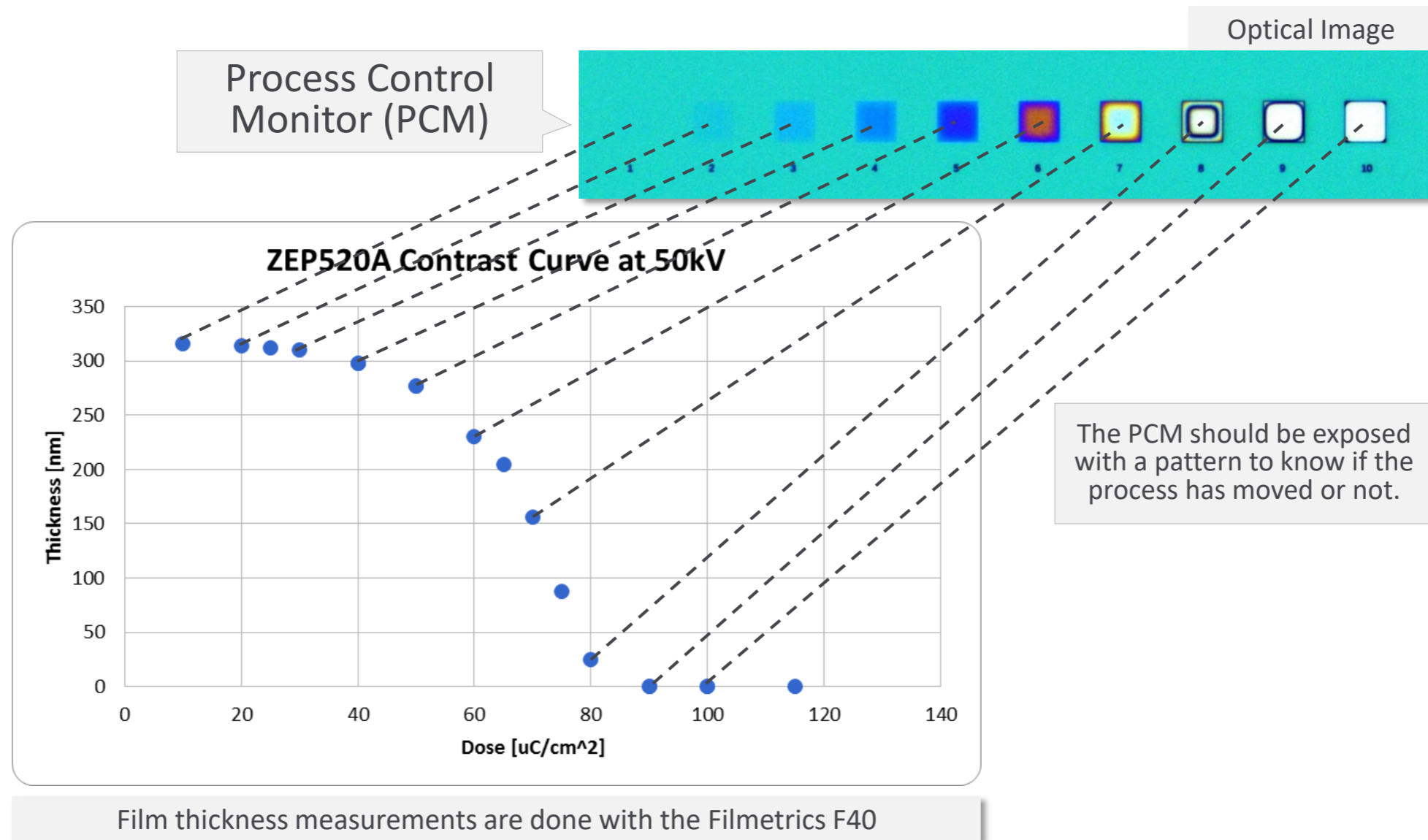


Laser or Mask Aligner Lithography

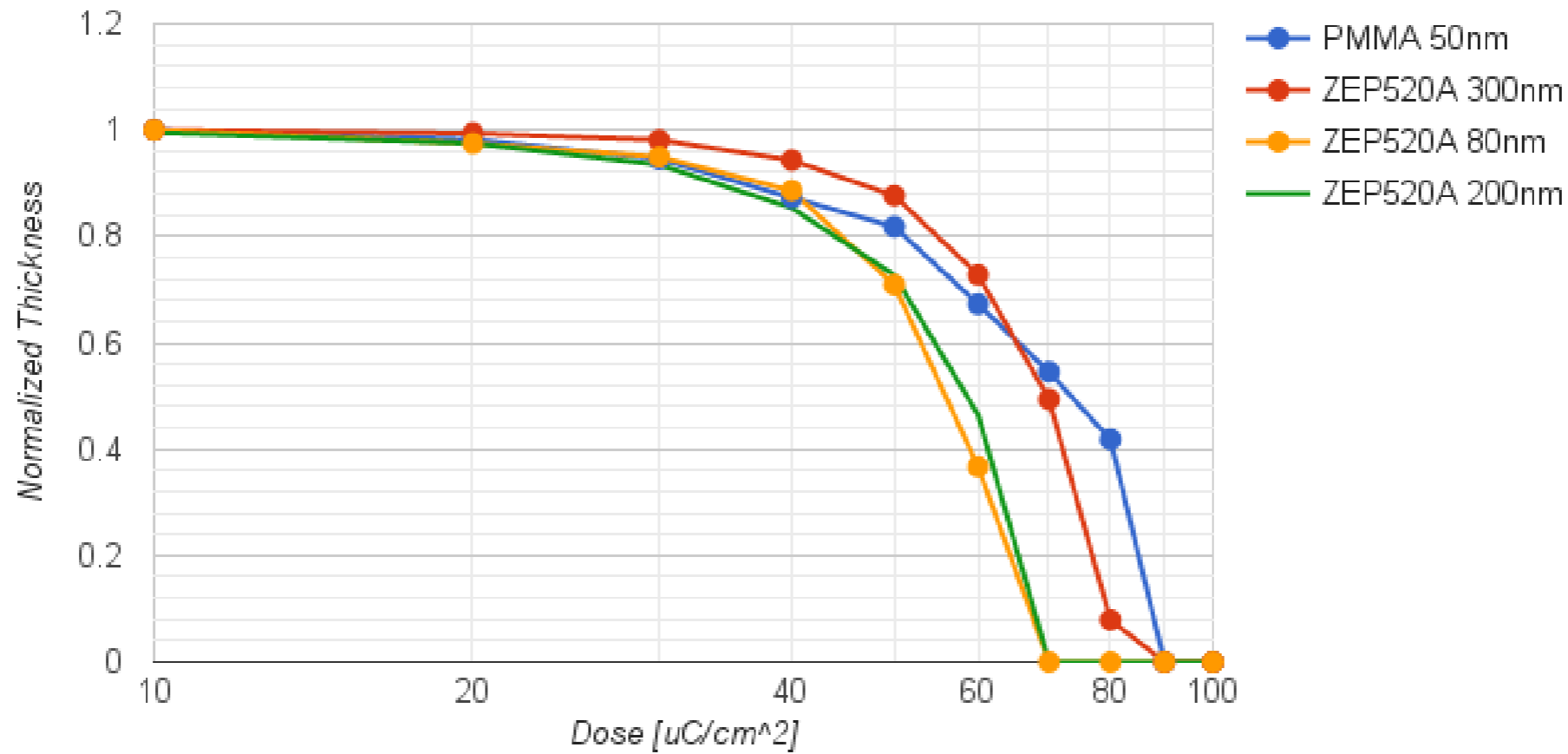
MicroChem S1800 Resist Spin Curves





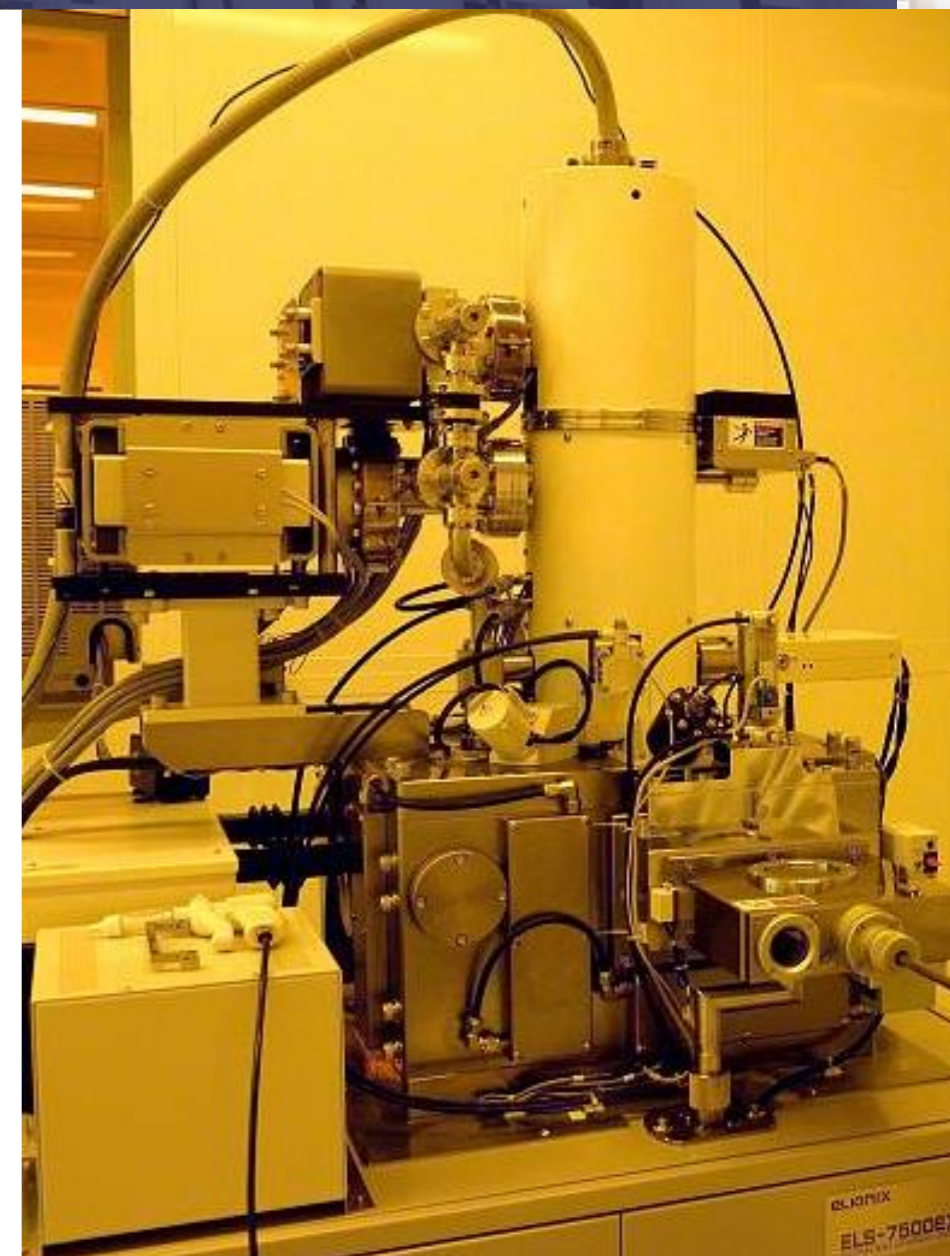
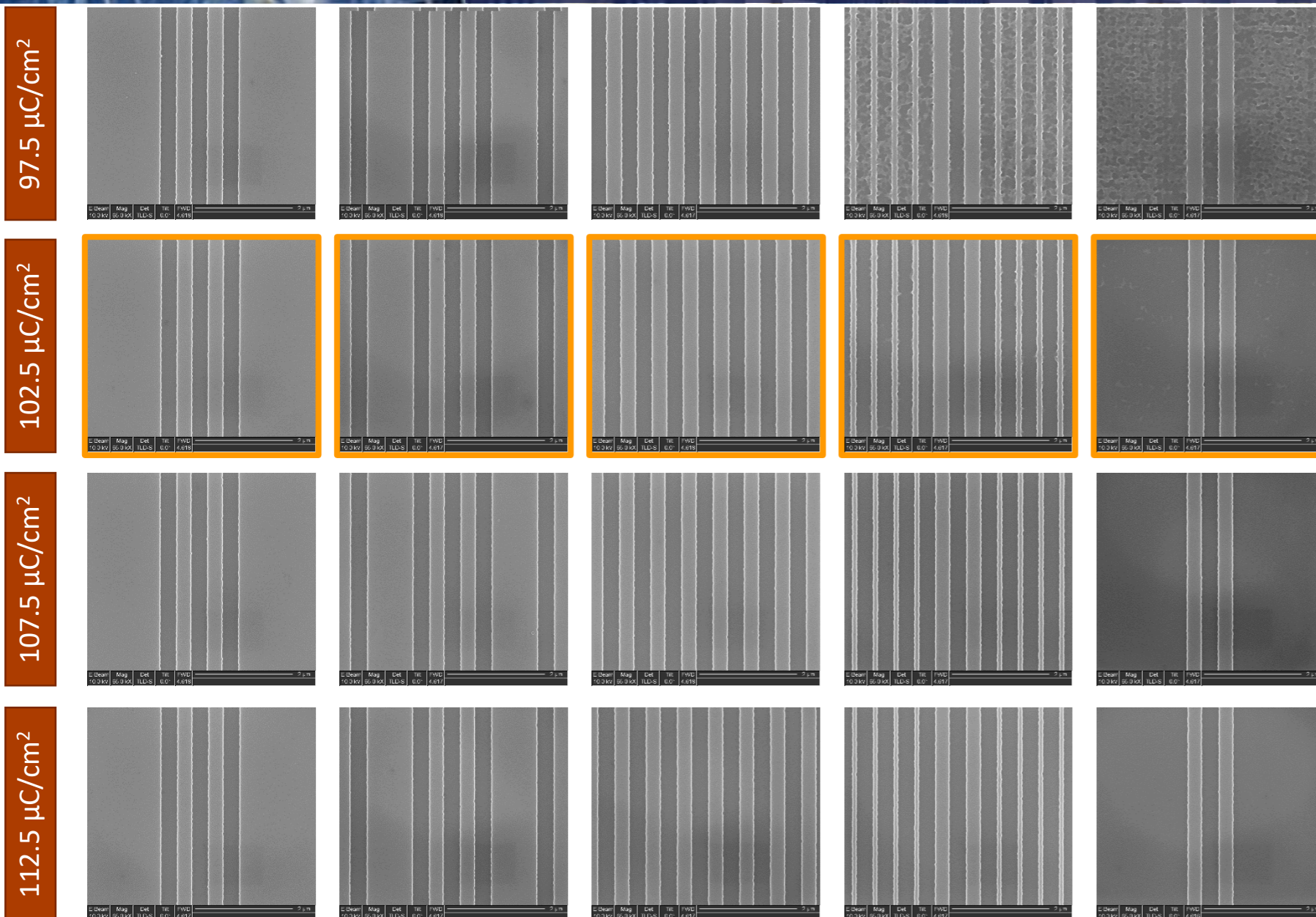


Contrast Curves: PMMA A2 and ZEP520A

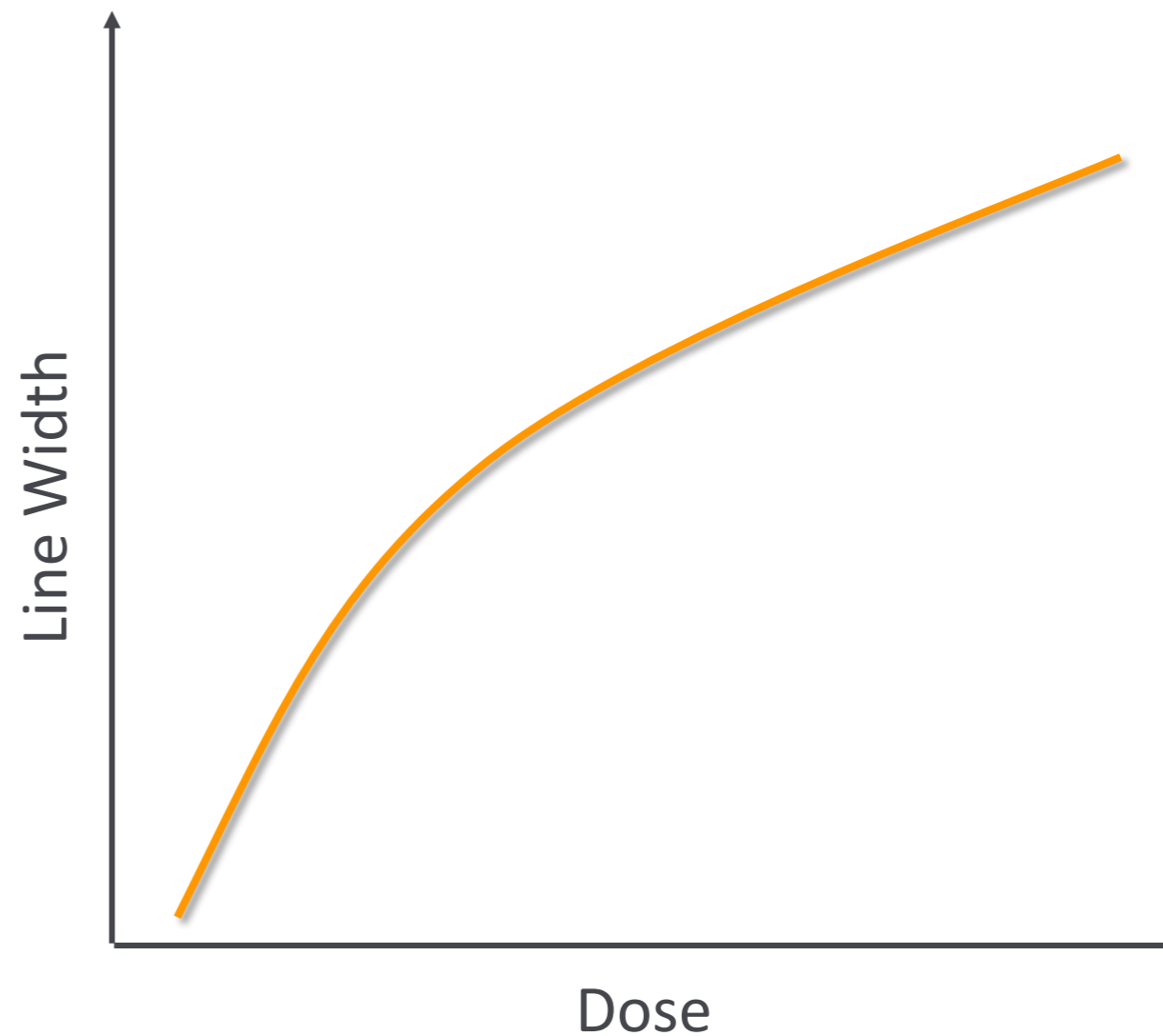
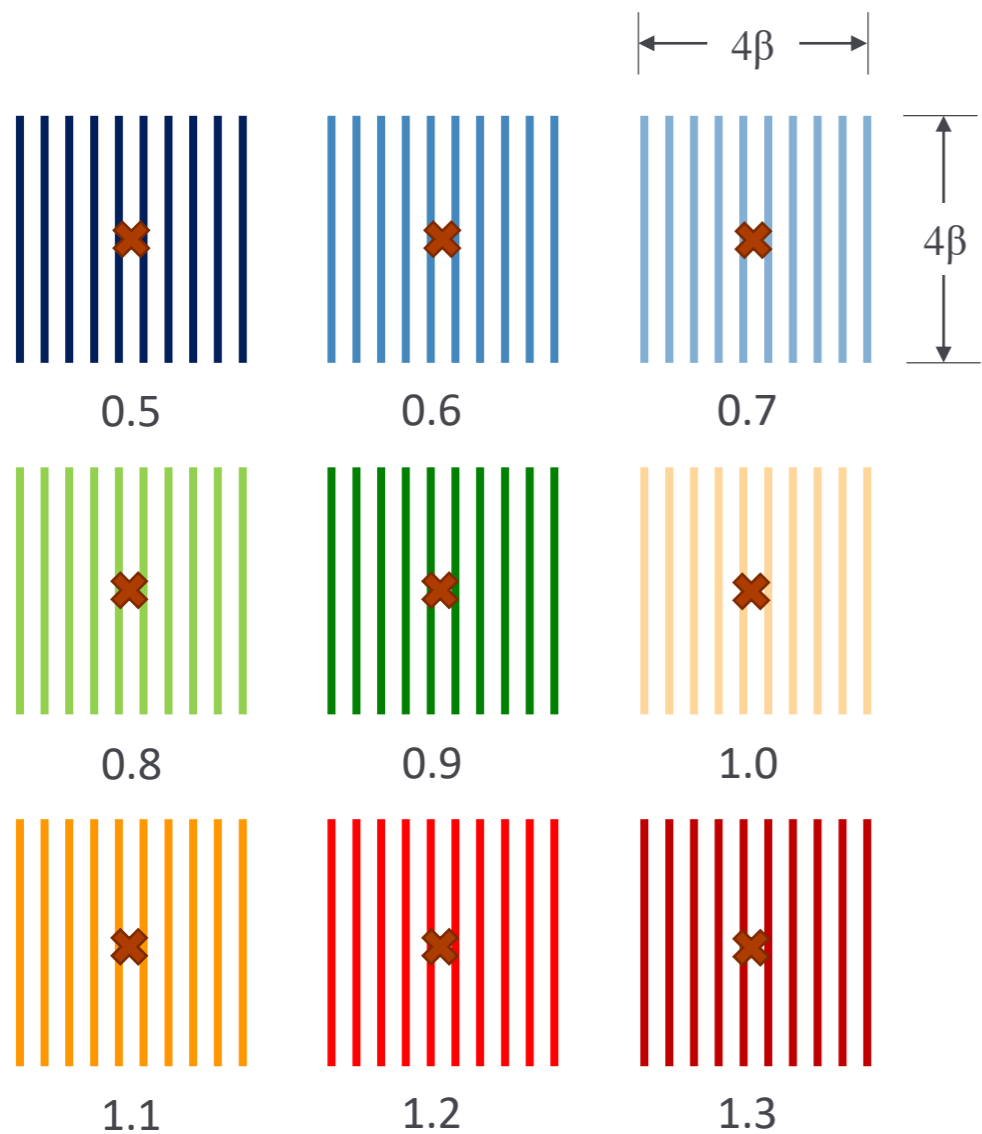


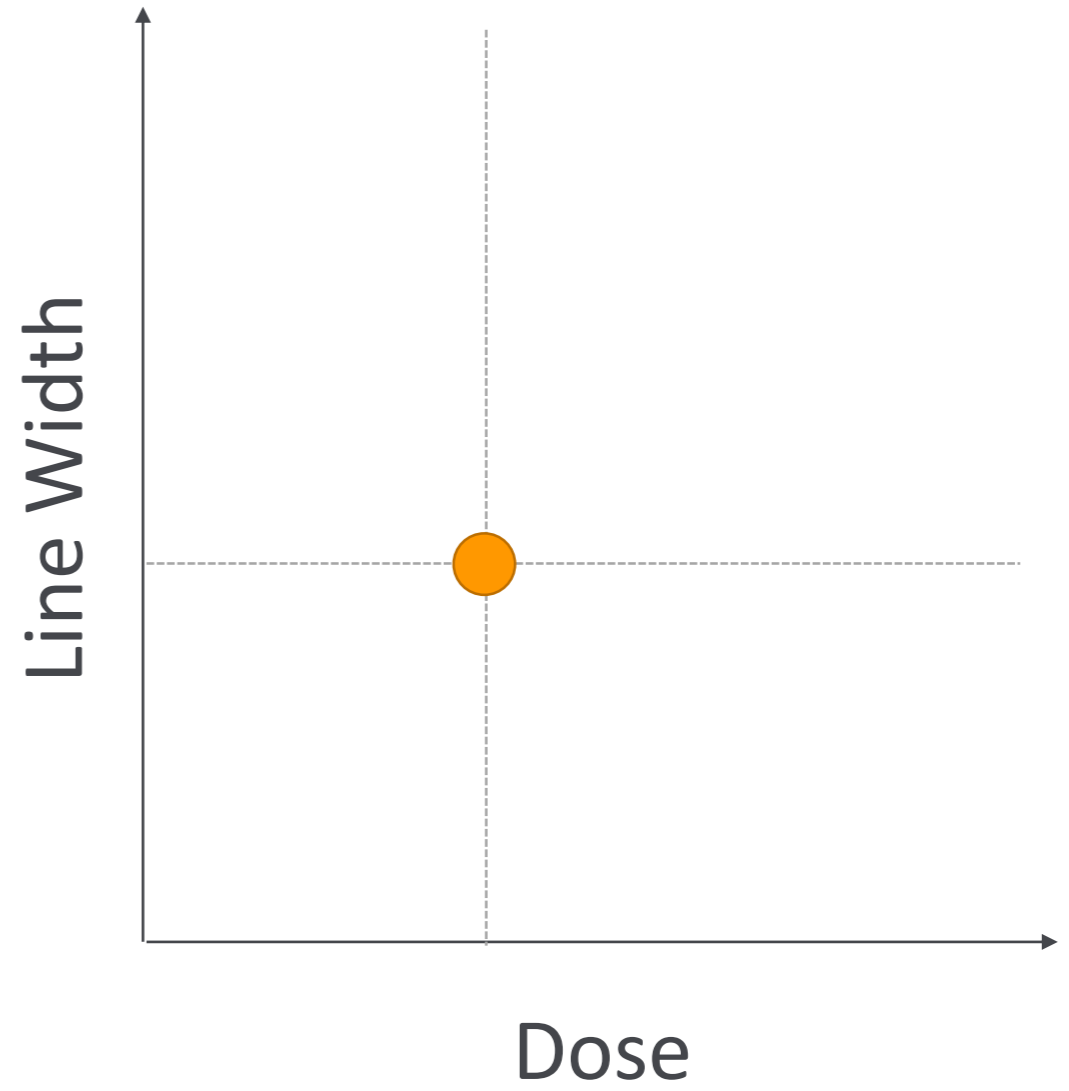
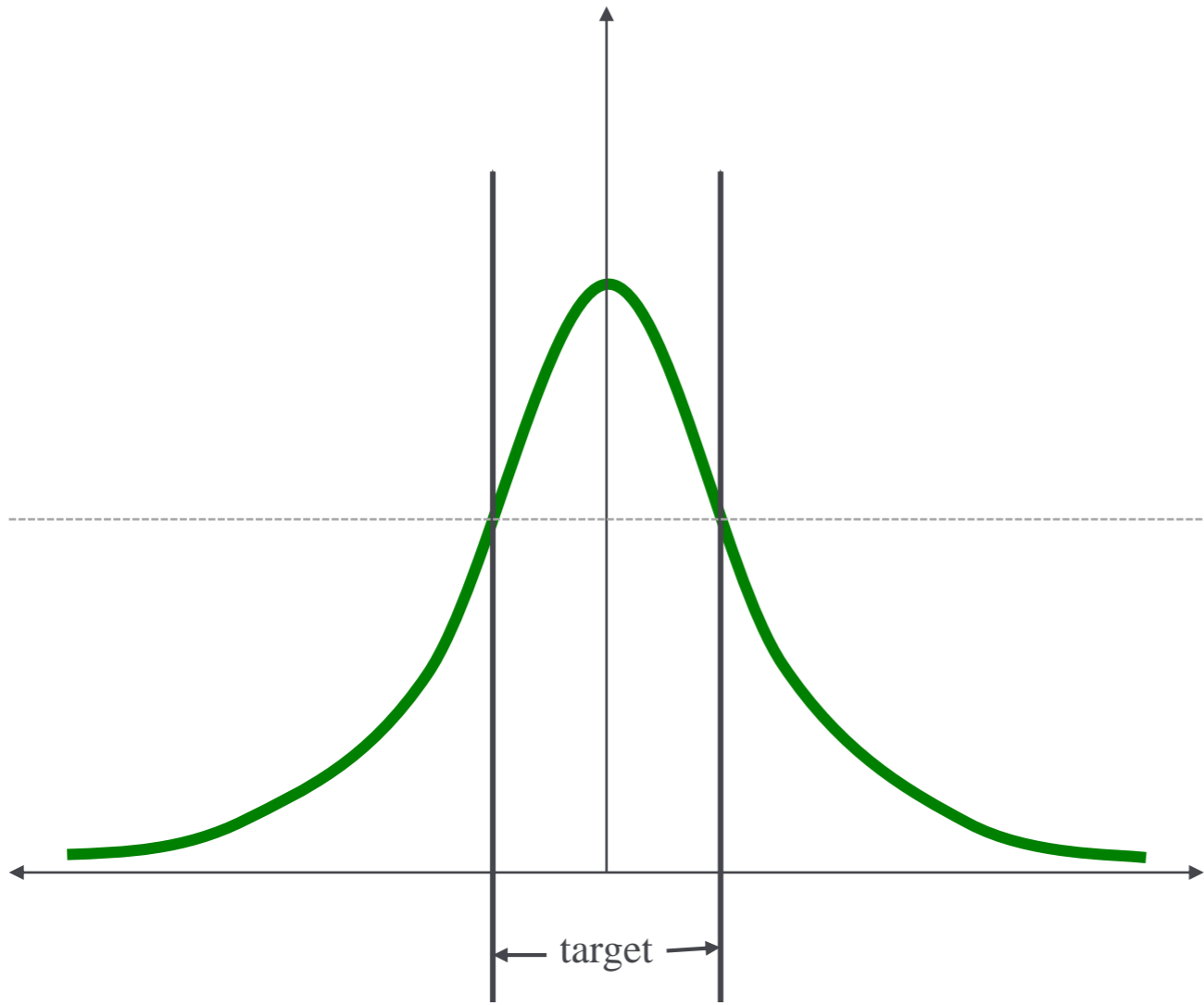
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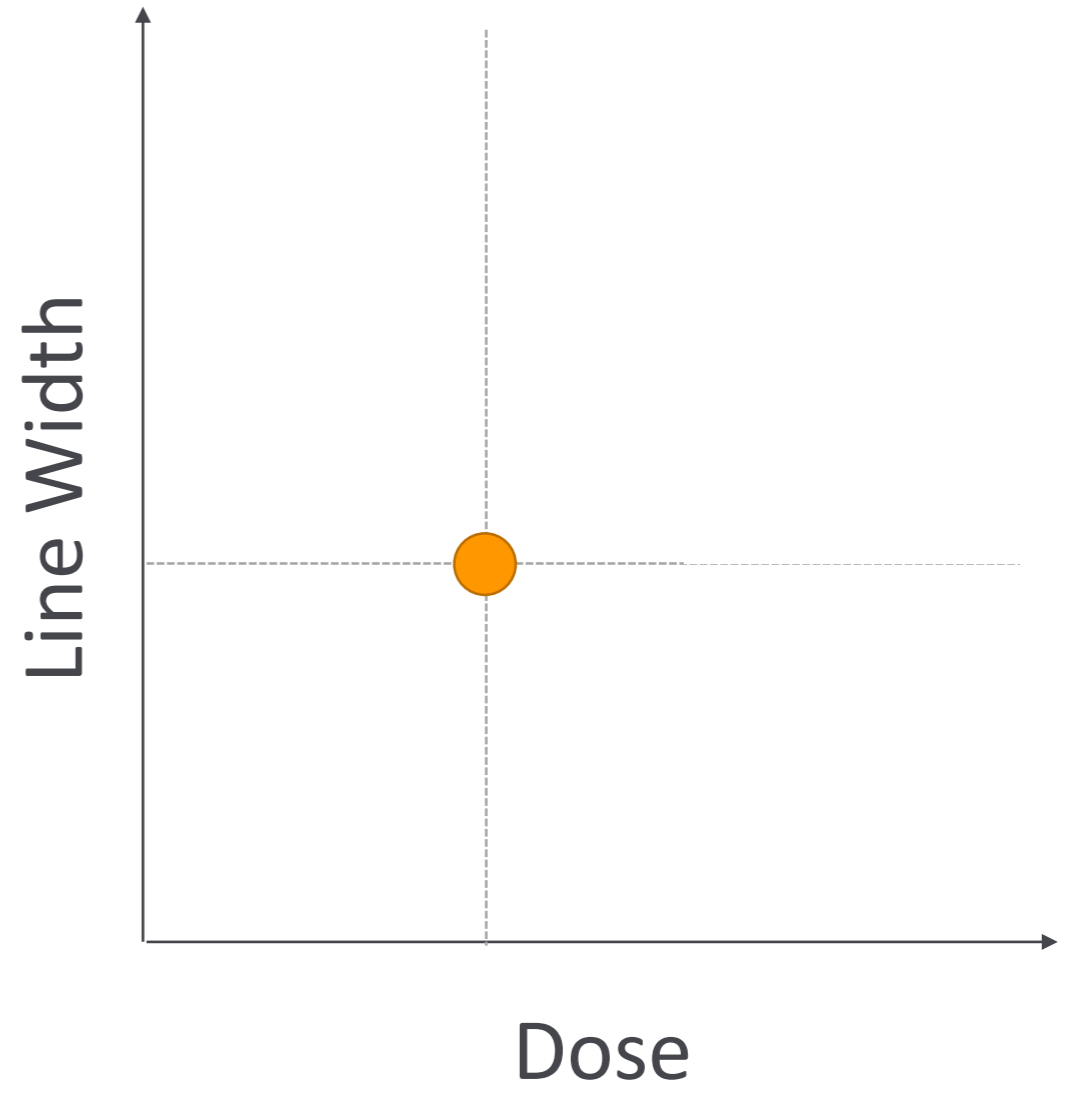
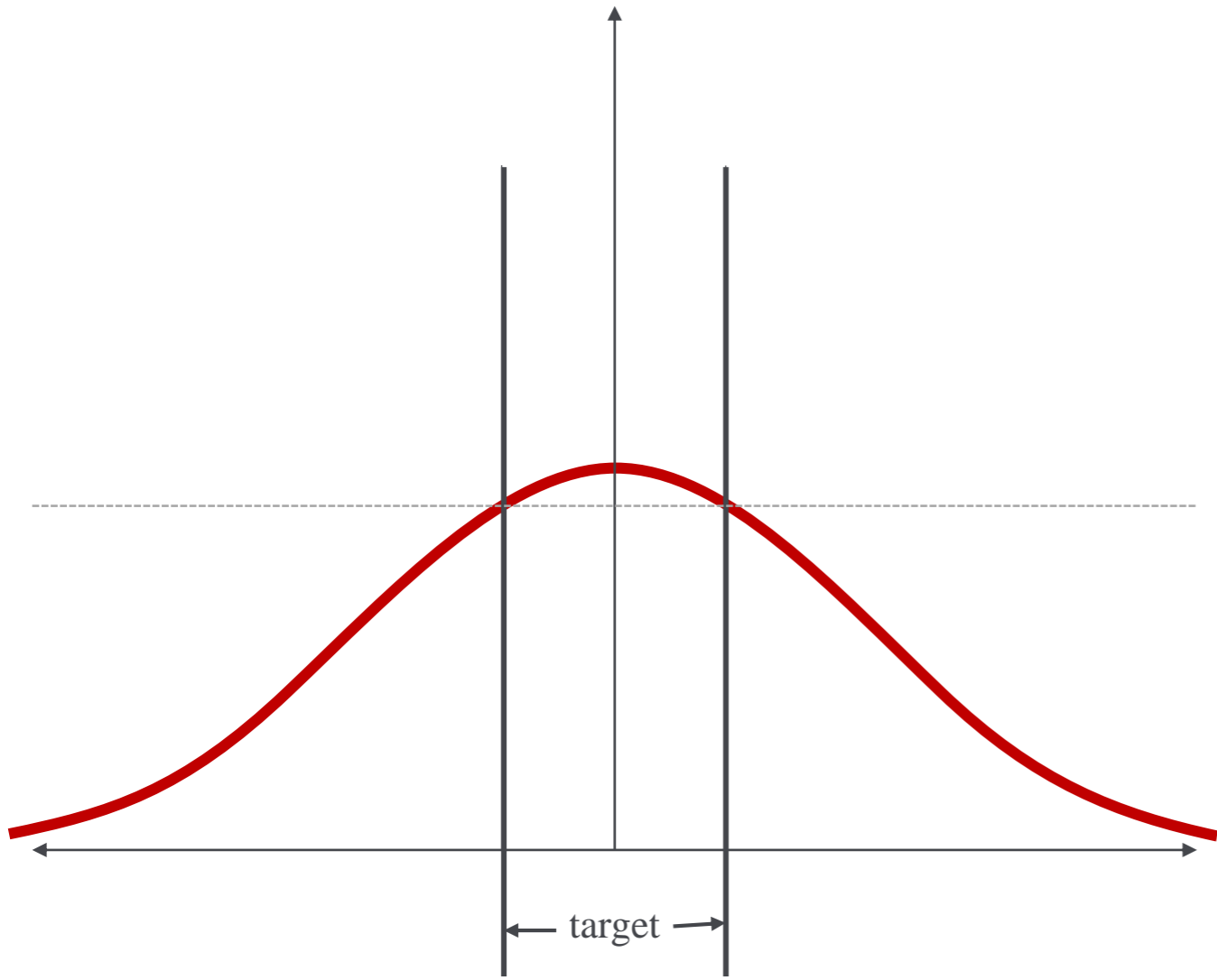


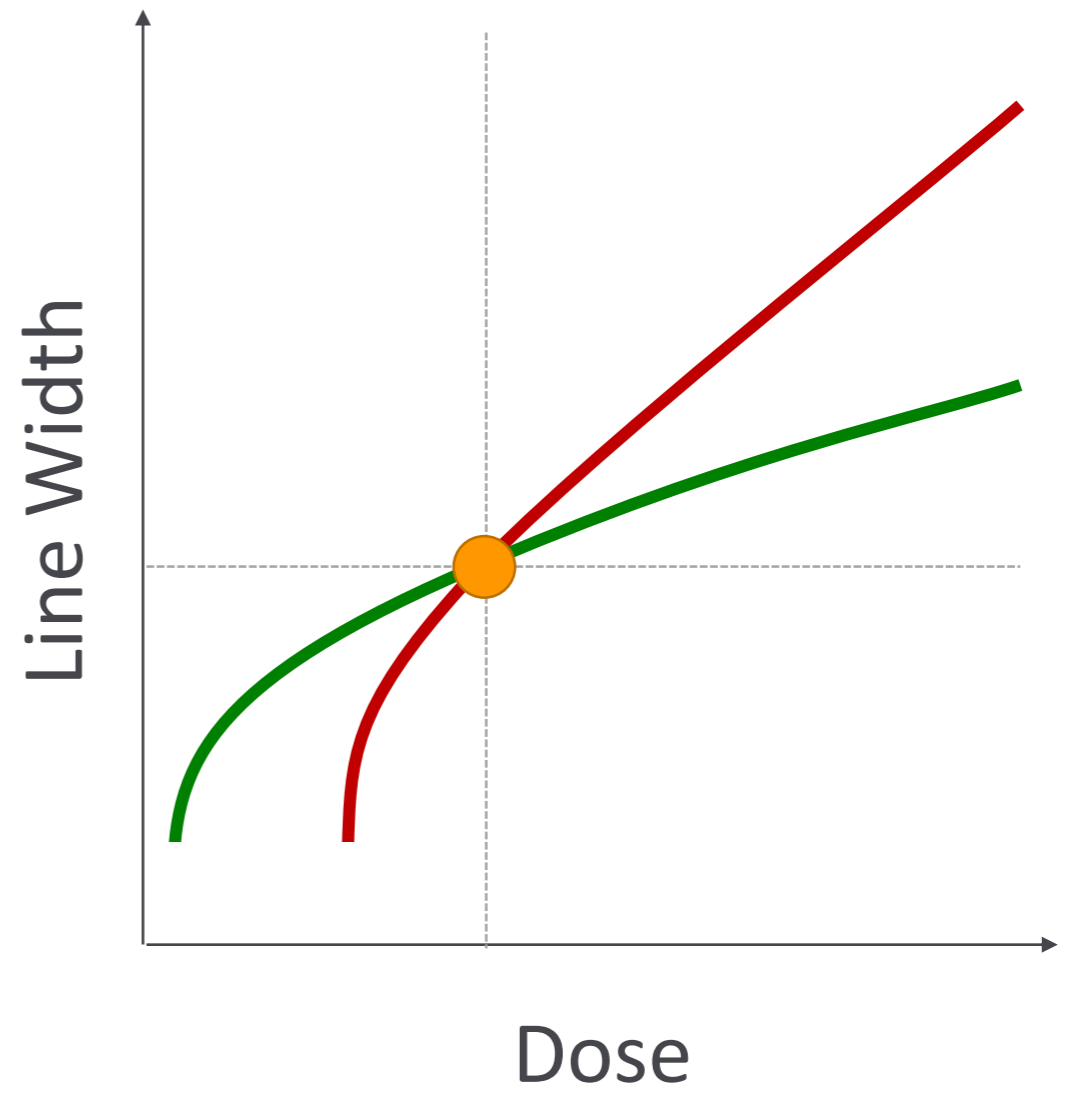
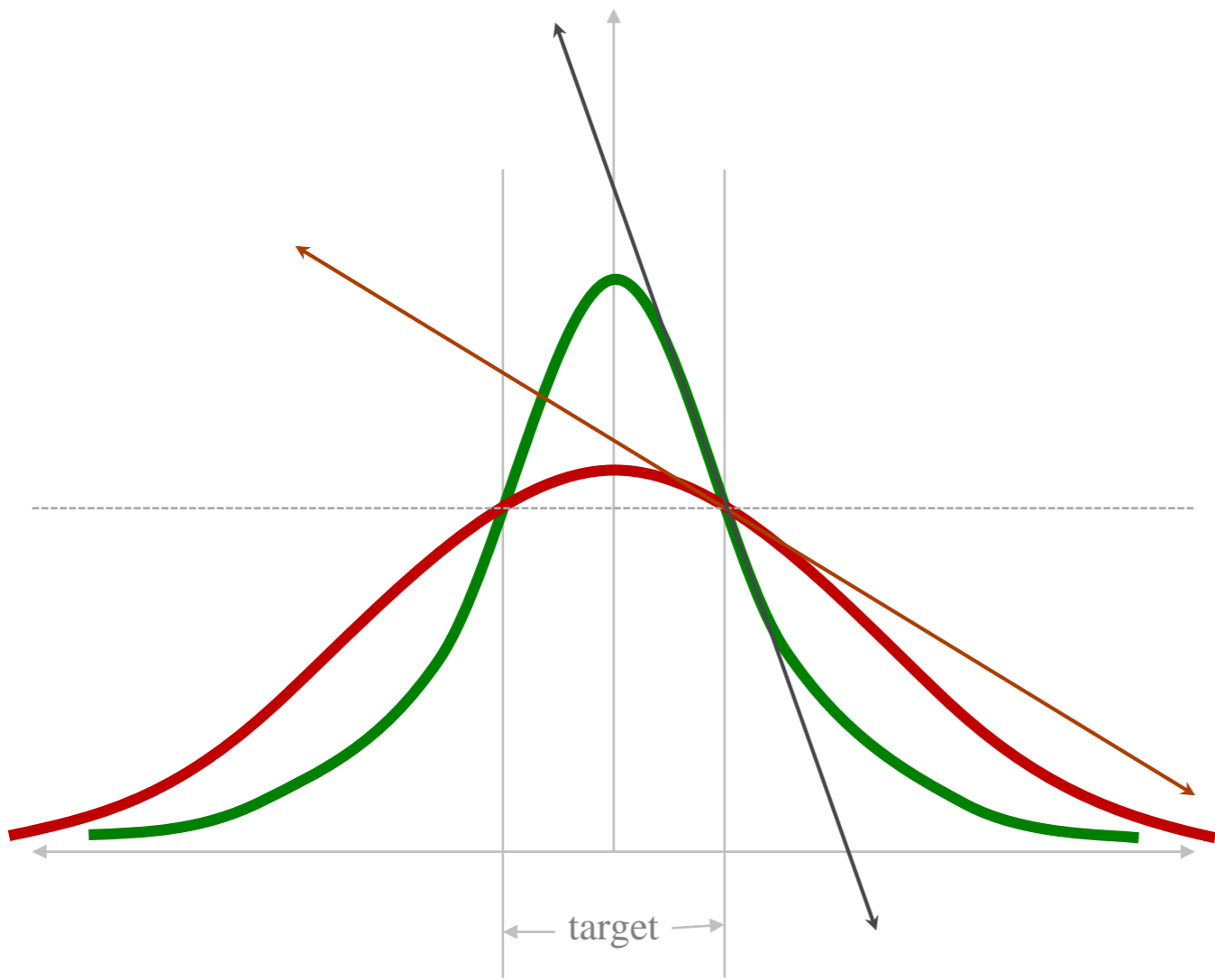


Graphical Definition: Exposure Latitude

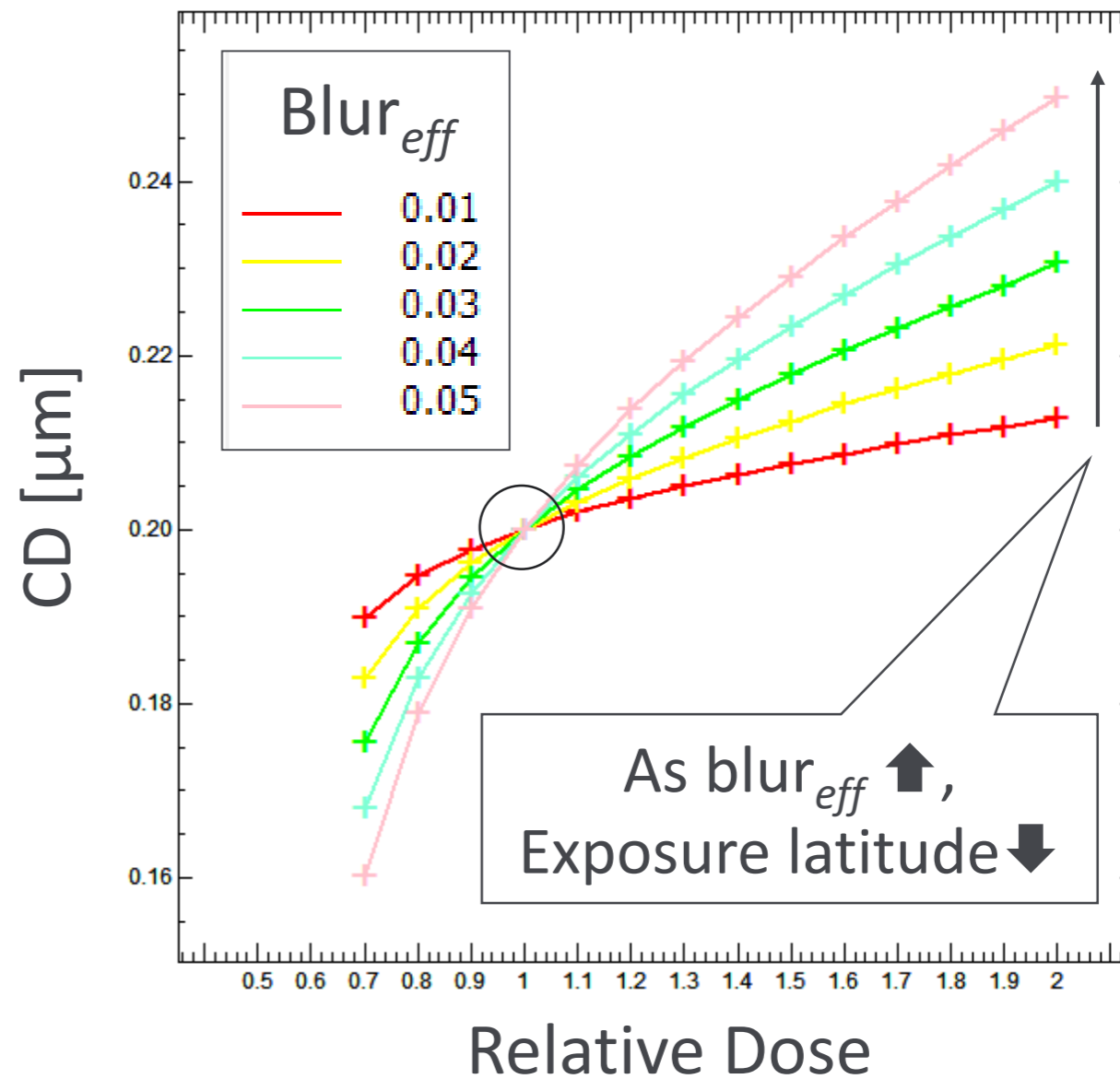
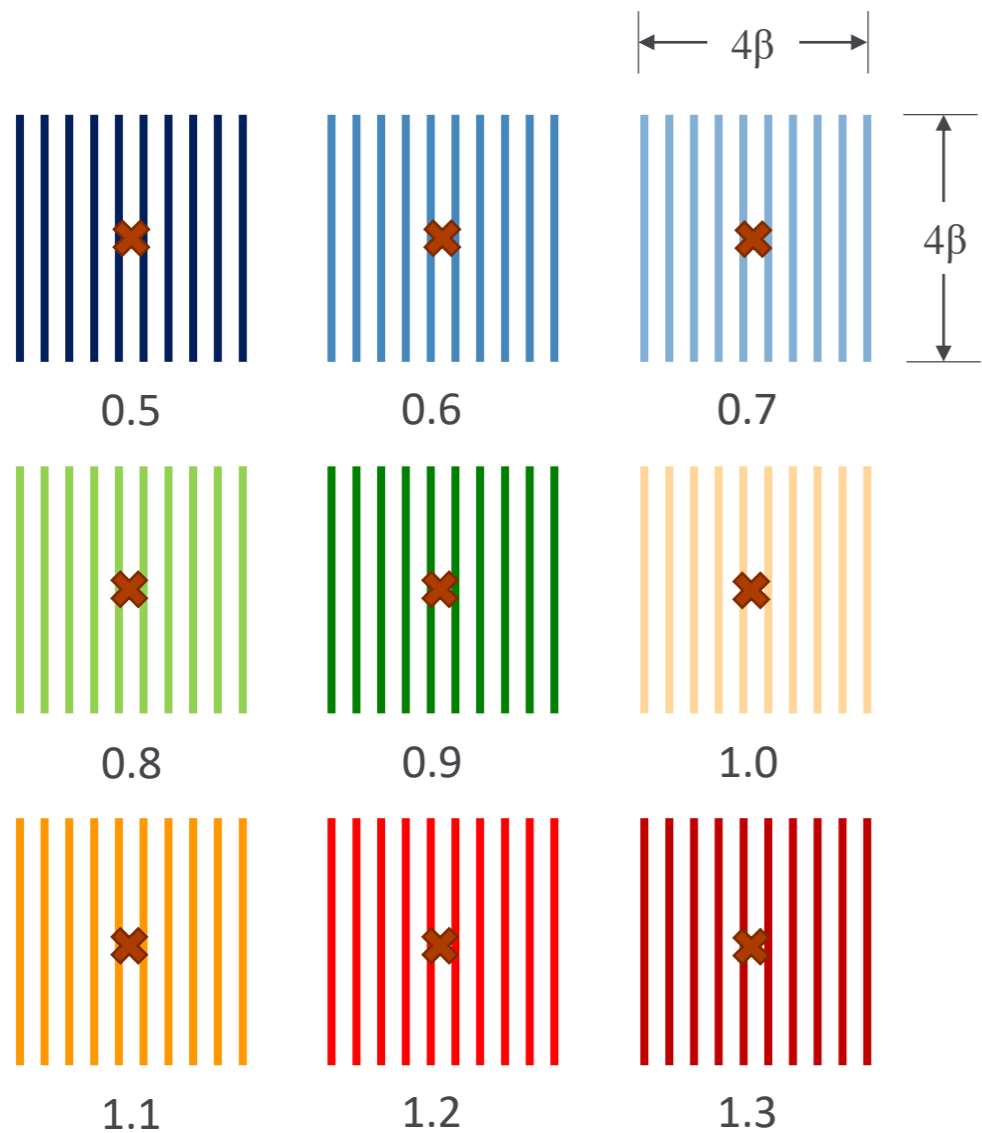






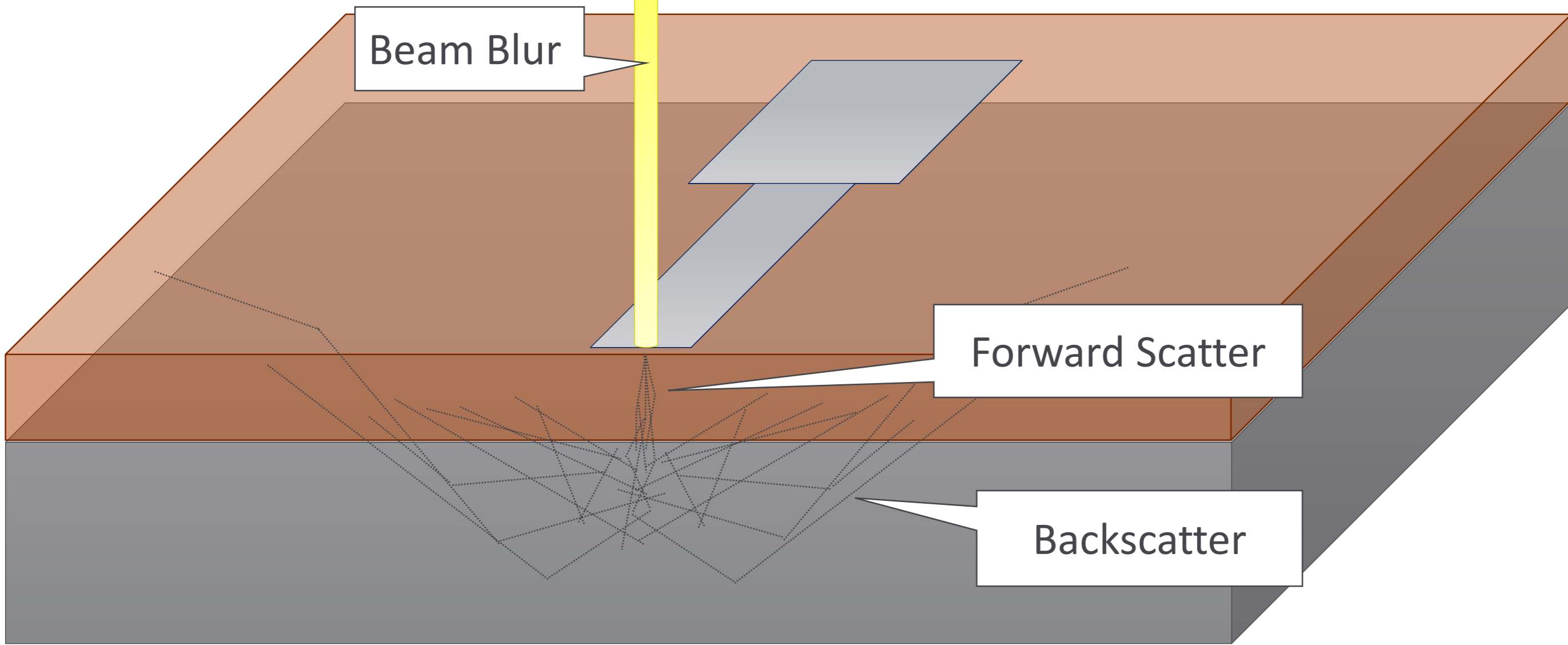


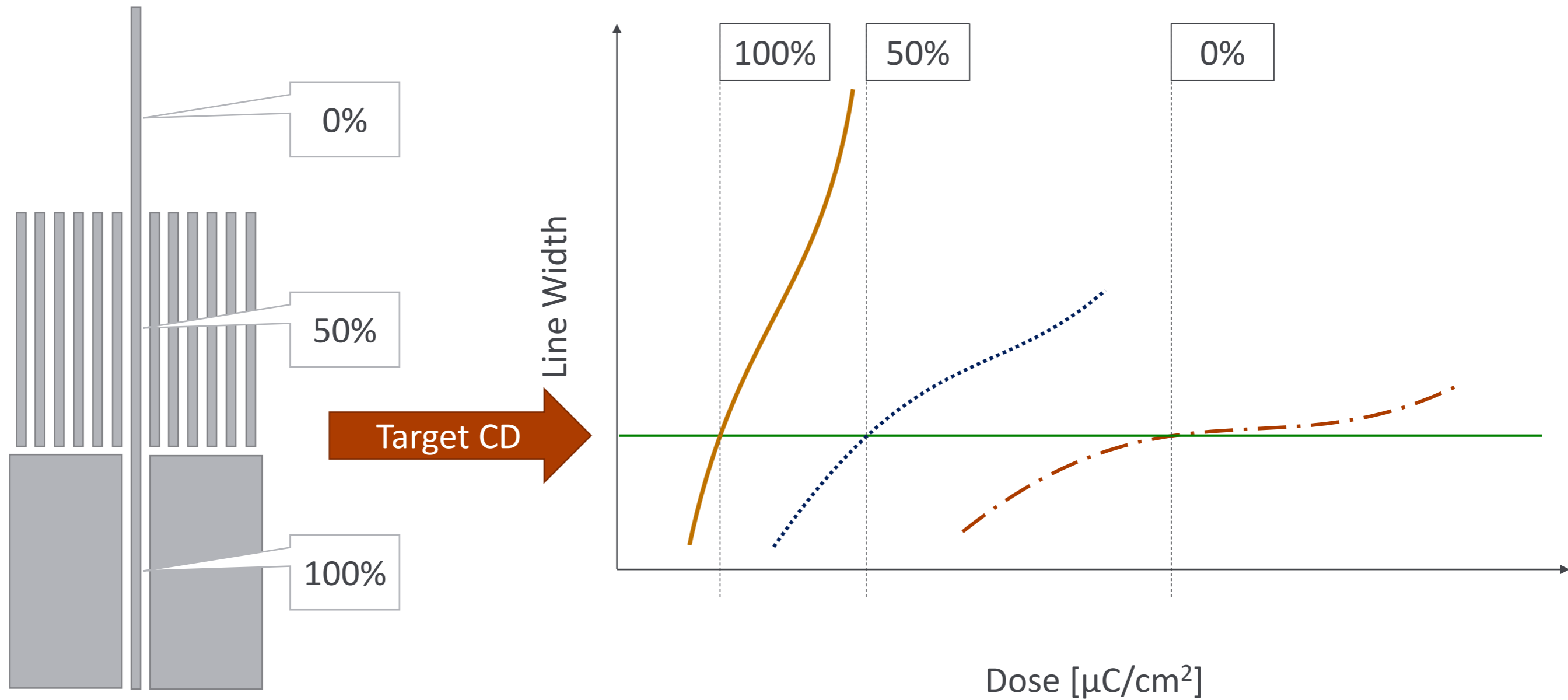
Simulation: Exposure Latitude

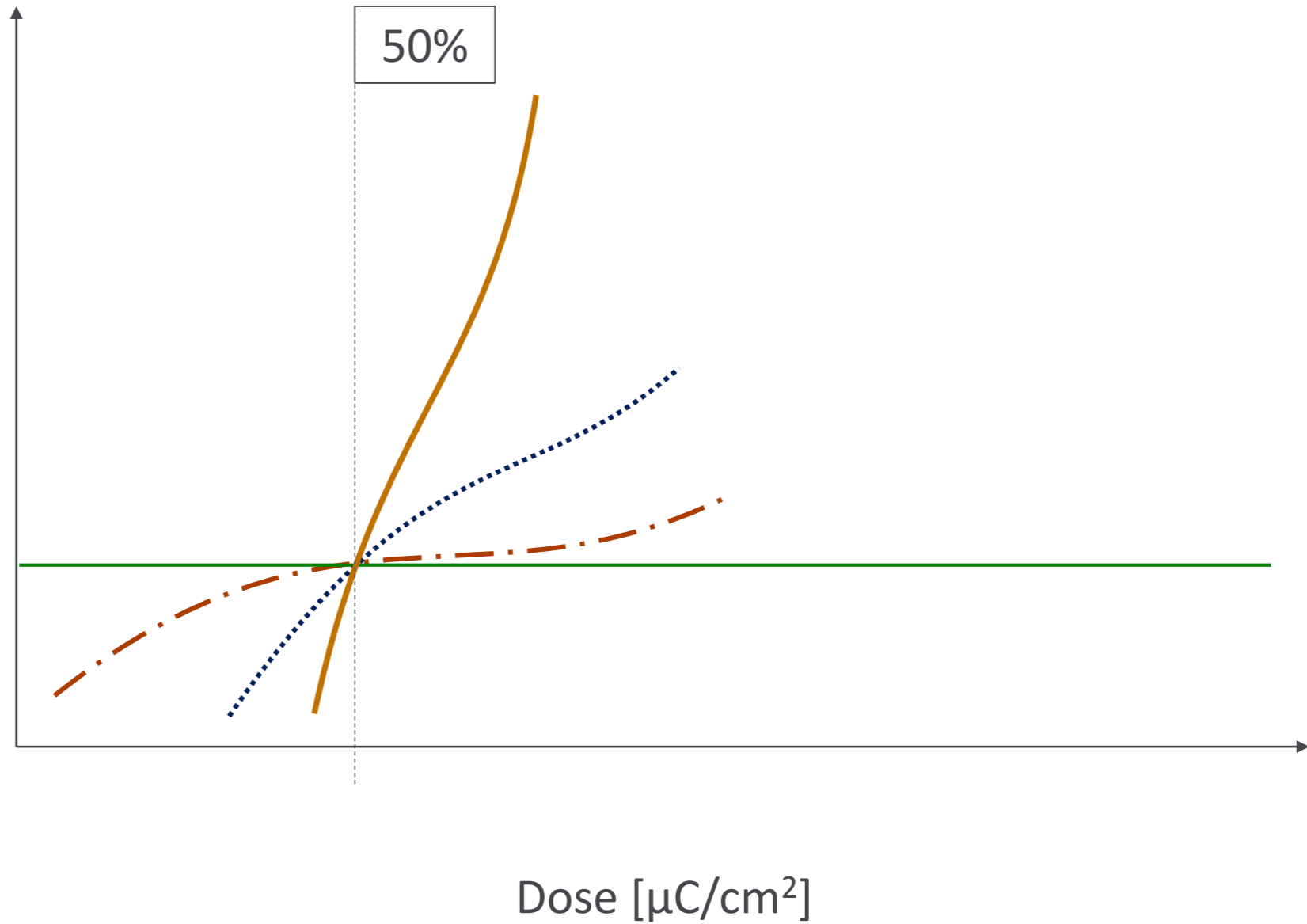
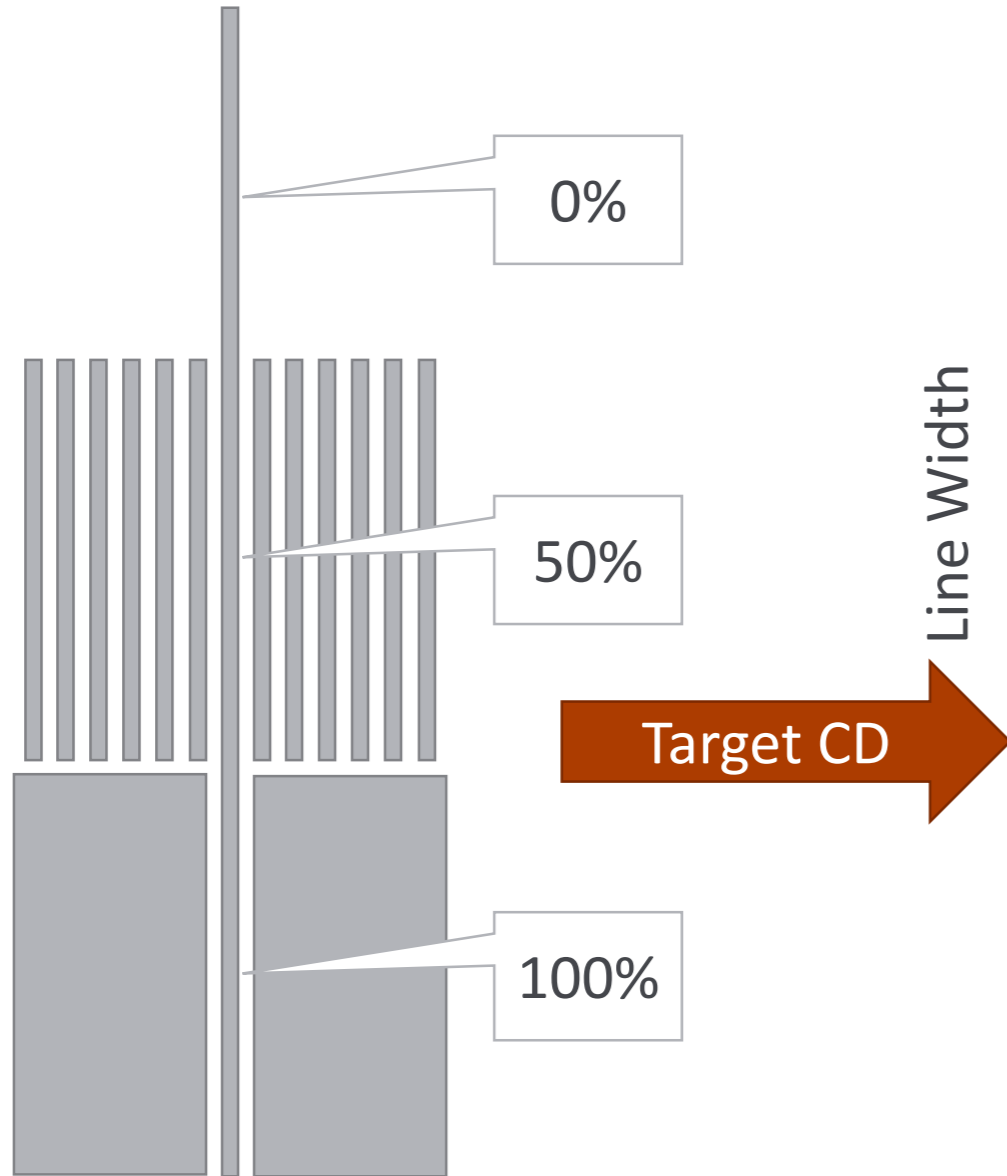


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- Getting Started
 - Spin Curves
 - Contrast Curves
 - Exposure Latitude
- Exposure Latitude
 - Effective blur
 - Pattern density
- Proximity Effect Correction (PEC) is a superposition of the pattern density dependent exposure latitudes



Soda Lime*	>2um	>10um
5" Mask	\$300	\$200
7" Mask	\$400	\$300

*add \$75 for Quartz

Soda Lime*	>2um	>10um
5" Mask	\$450	\$300
7" Mask	\$650	\$400

*add \$75 for Quartz

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INSTRUMENTS