

Measuring Step Heights from Top-Down SEM Images

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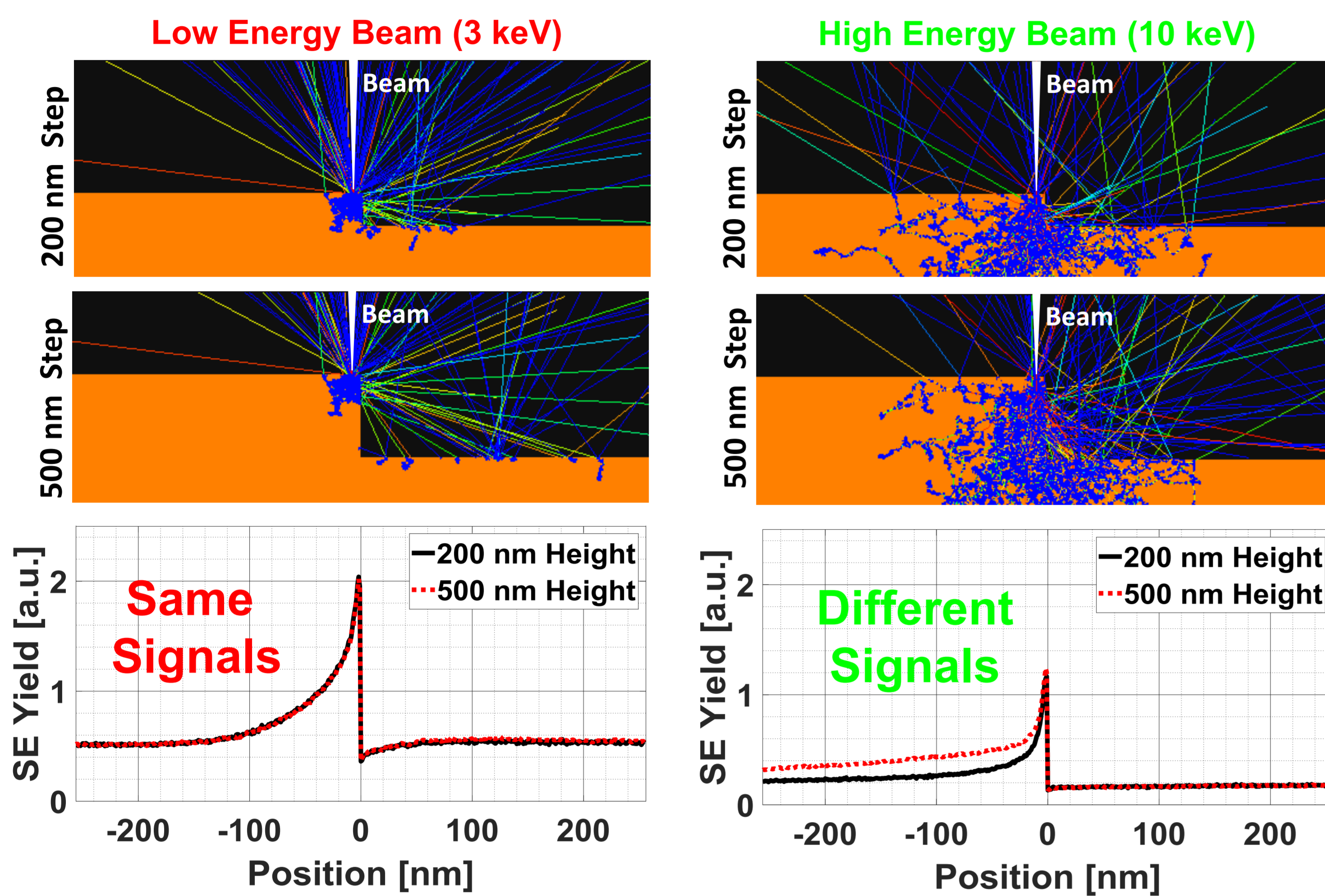
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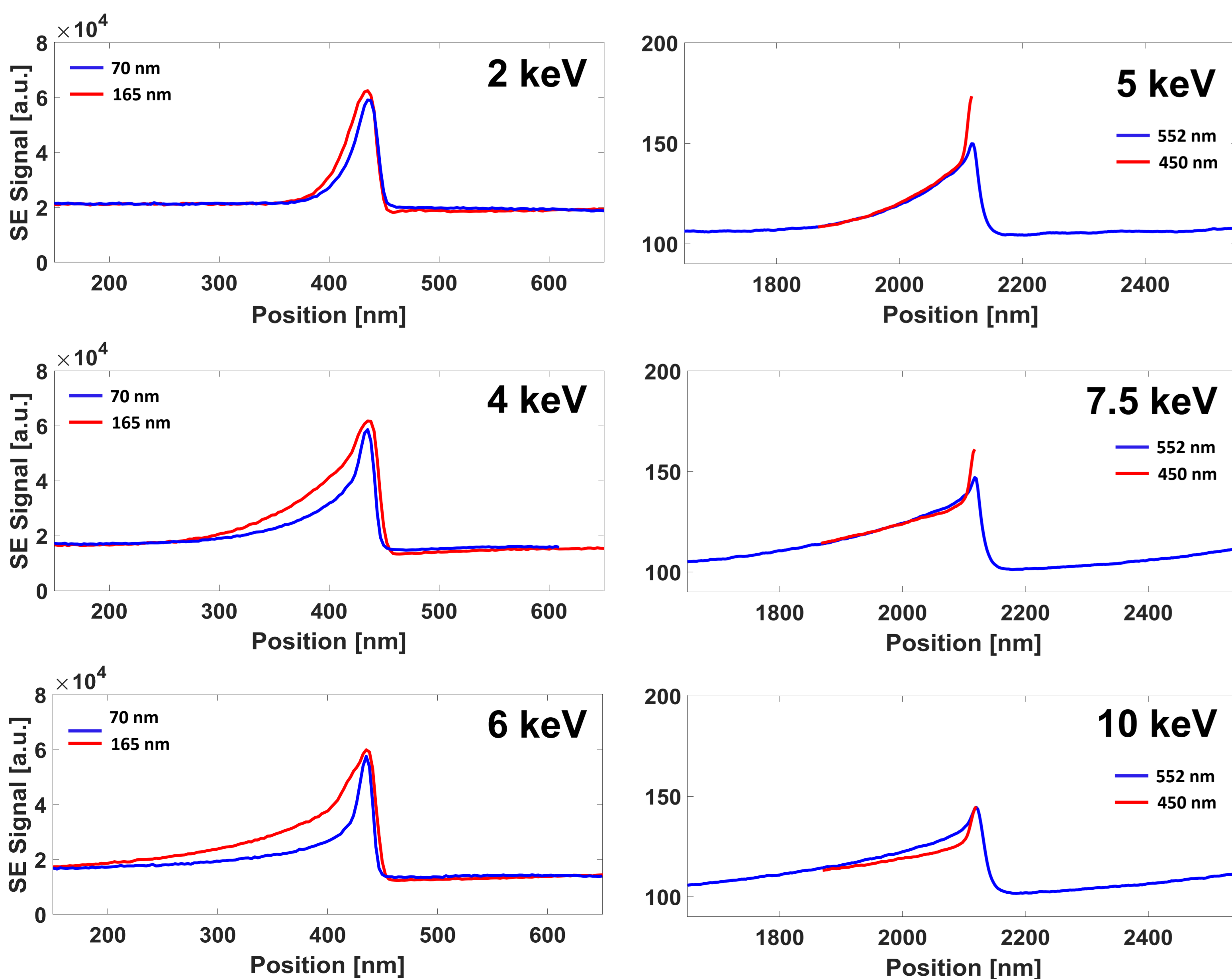
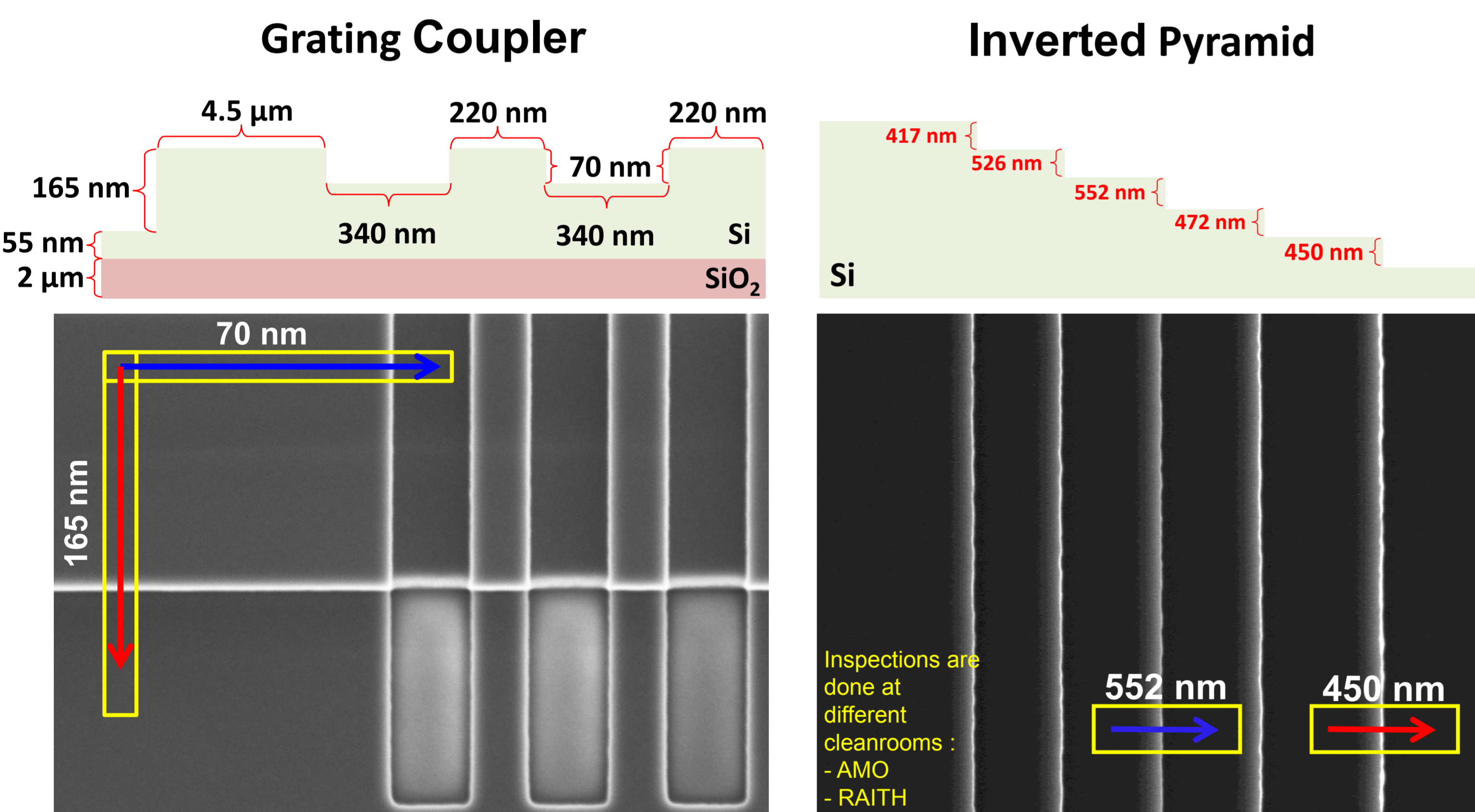
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The **purpose** of this study is to explore the possibility to extract step heights from a top-down SEM image. The **idea** is to vary the beam energy to change the size of the electron-matter interaction volume. The **results** show that the emission from the sidewall differs for different heights at different energies. The **conclusion** is that step heights can be predicted from top-down SEM images taken at various energies.

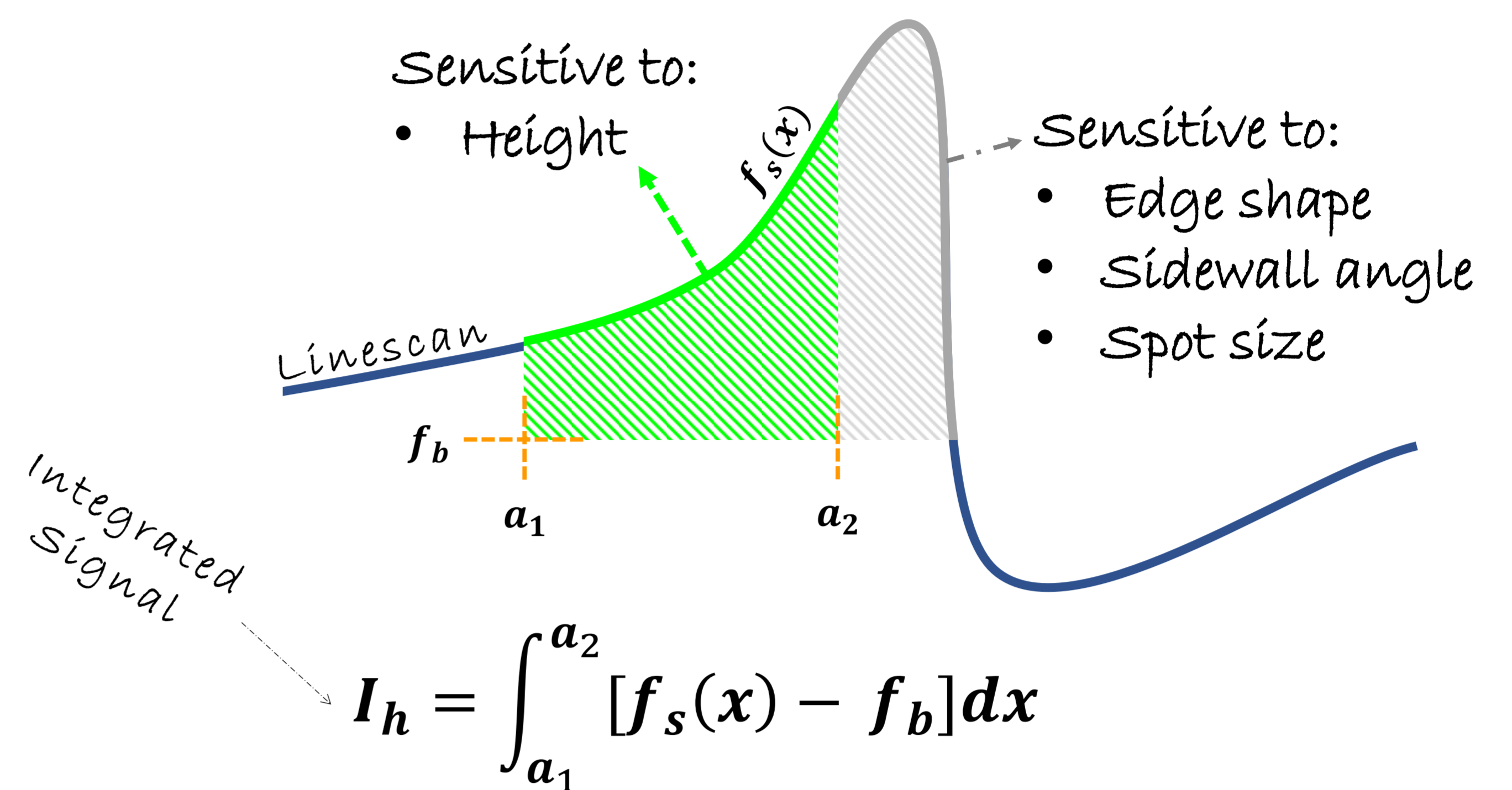
1| THE PRINCIPLE (Using Simulations)



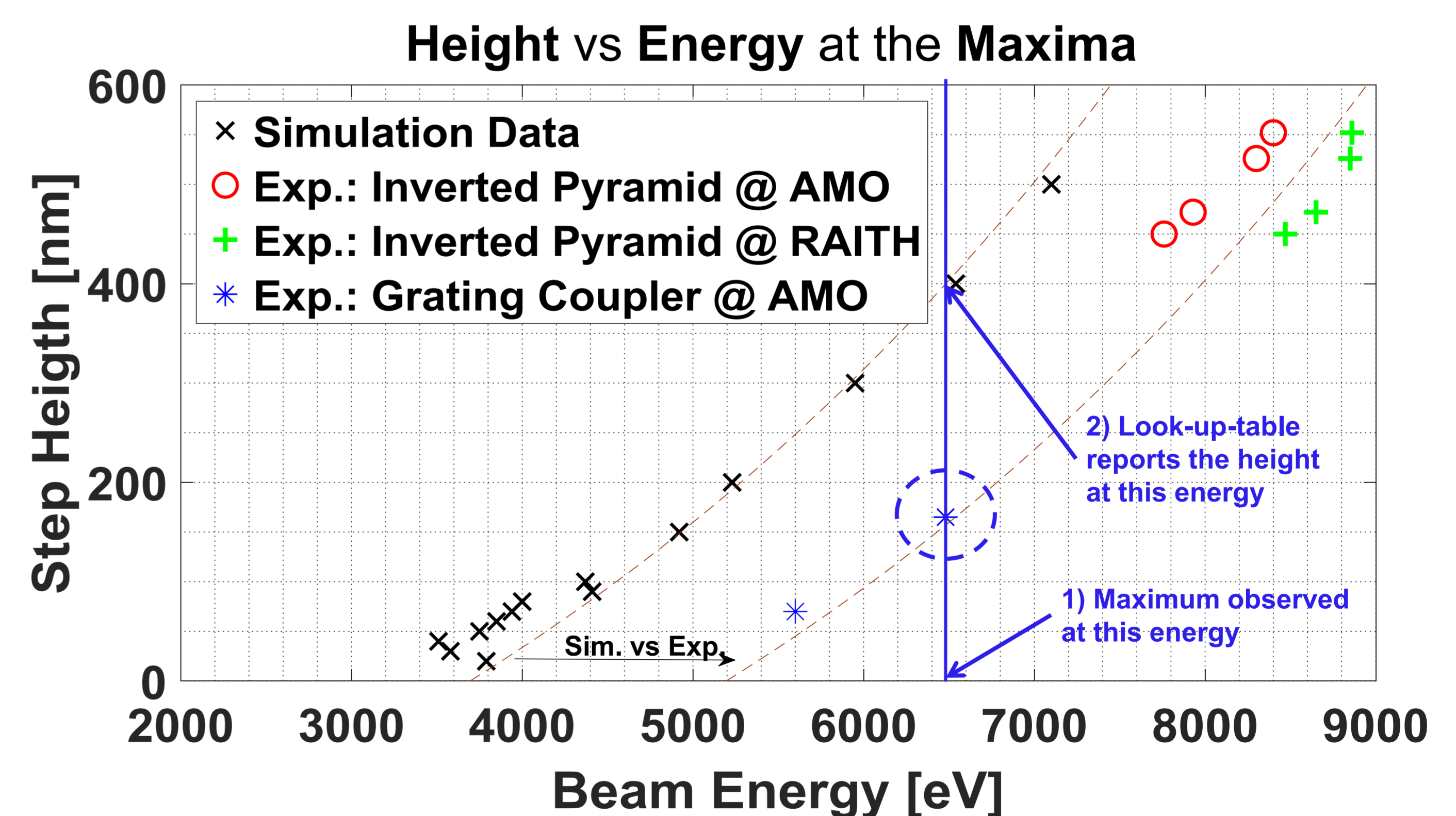
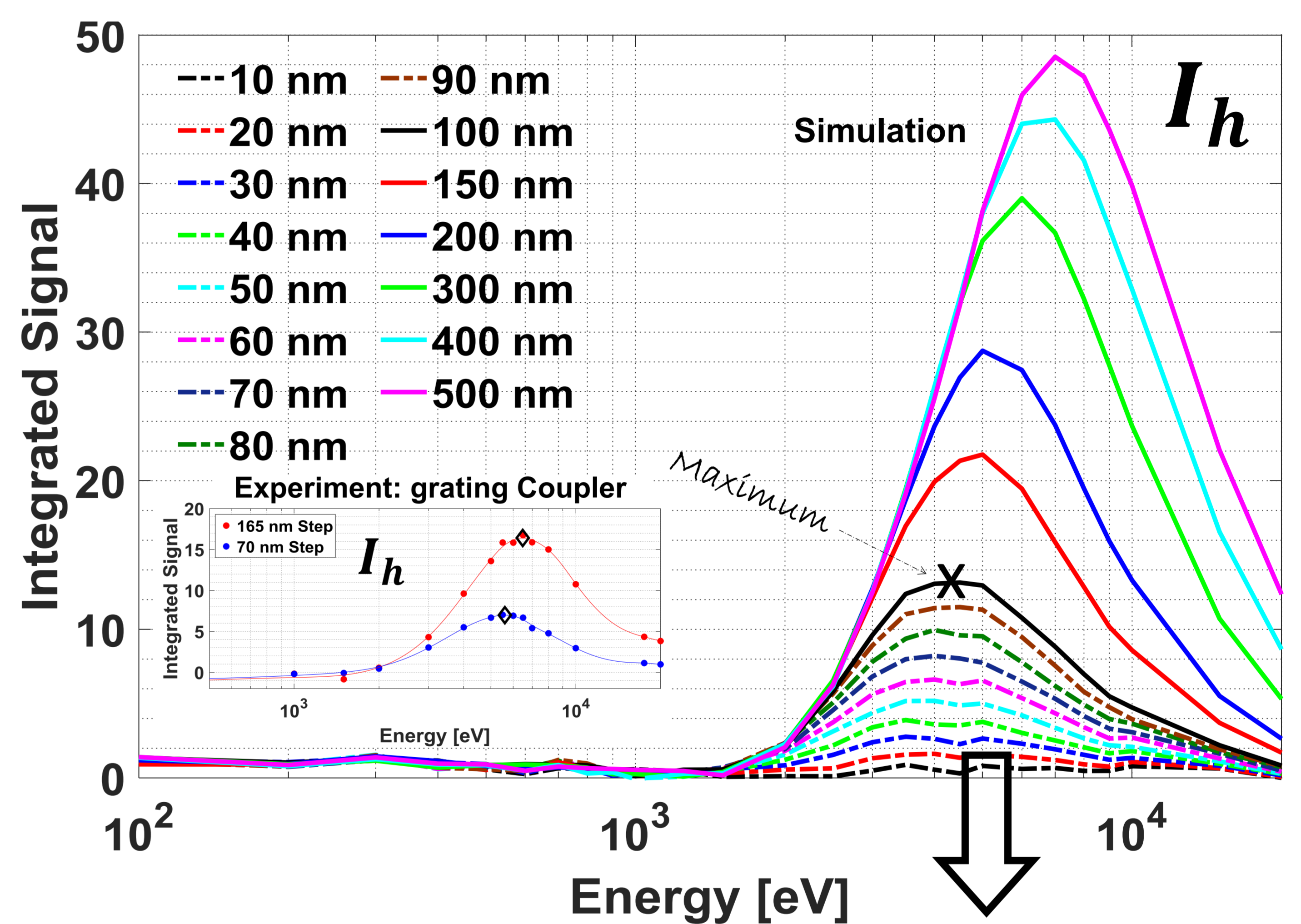
3| EXPERIMENTS



2| QUANTIFICATION METHOD



4| RESULTS (Simulation + Experiment)



5| CONCLUSIONS

- Part of the SE signal is **sensitive** to height but **not sensitive** to other parameters such as **edge shape**, **sidewall angle** and **spot size**.
- A practical method has been developed to quantify heights from top-down SEM images.
- This work is a nice example of how Monte-Carlo simulations can be used to analyze complex scenarios [1].

6| REFERENCE

[1] T. Verduin, Quantum Noise Effects in e-Beam Lithography and Metrology, TU Delft, 2016.