RELION 4 and beyond - Structural heterogeneity and algorithmic robustness

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In this talk, I will discuss the current computational challenges in cryo-EM and the ongoing work in algorithmic development based on modern machine learning approaches, in RELION and upcoming software packages. By incorporating more prior information into the reconstruction process and better accounting for structural heterogeneity, we aim to create robust algorithms that can run with improved automation and handle smaller datasets or datasets with lower signal-to-noise ratios. I will also discuss how this development presents new challenges for data validation and how this issue can be handled.