

# RA-4: Multiscale Property Estimation

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- **Development of stochastic emulators:** statistical models to substitute the expensive fine-scale solvers while accounting for the uncertainty in their effect.
- **Bayesian mapping from microscale parameterizations to macroscale variables:** building a regression from a high-dimensional input space to lower-dimensional output space. These models can be trained “on-the-fly”.
- **Latent structure discovery and data imputation problem:** Condense the information furnished by the fine-scale details but also identify hidden physical interactions by determining connections between microscale features and macroscale response.
- **Sequential Monte Carlo:** Utilize a set of random samples (particles) which are propagated using importance sampling and resampling mechanisms. Each particle can be thought of as a possible configuration of the system state, the likelihood of which is assessed with respect to the available data.