1. Motivation and Objective

- Uncertainty is an inevitable aspect of modeling
- Models are refined from experimental data (e.g., Bayes' rule)

2. Experimental Design Method

3. Application: Combustion Kinetics

- Autoignition of H₂O₂ mixture
- Experimental goal: infer kinetic parameters from ignition delay data
- Design ONE experiment (2 design variables): expected utility (left); posteriors from inference (right)

4. Application: Source Inversion

- 2D diffusion from a source (convection to be added in the future)
- Experimental goal: infer source location from concentration measurements
- Design ONE experiment (sensor placement): results from 100 optimization runs (left); posteriors from inference (right)

5. Conclusions and Future Work

- A framework is developed for optimizing experimental designs such that data are most useful for inference
- This framework is very general, well-suited for computationally intensive models, and easily generalizable to multi-experimental design
- Future work: optimal sequential experimental design

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