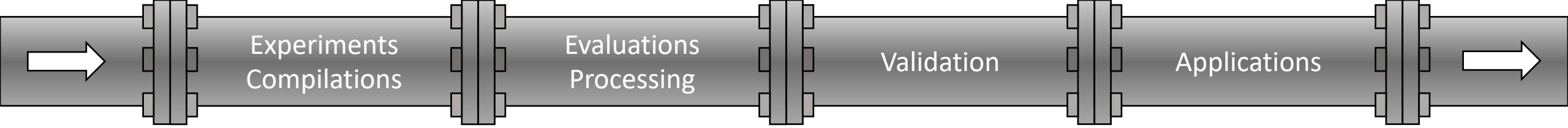

Building a Long-Range AI/ML Vision

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Gaussian Processes

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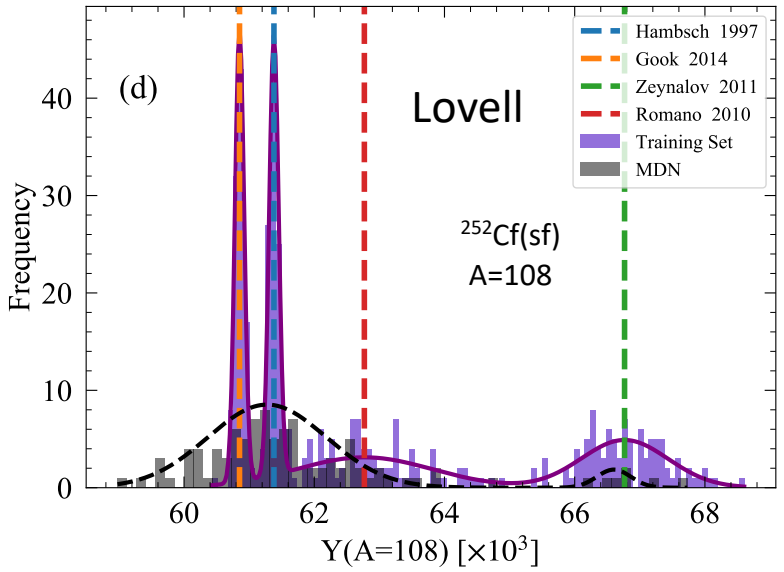
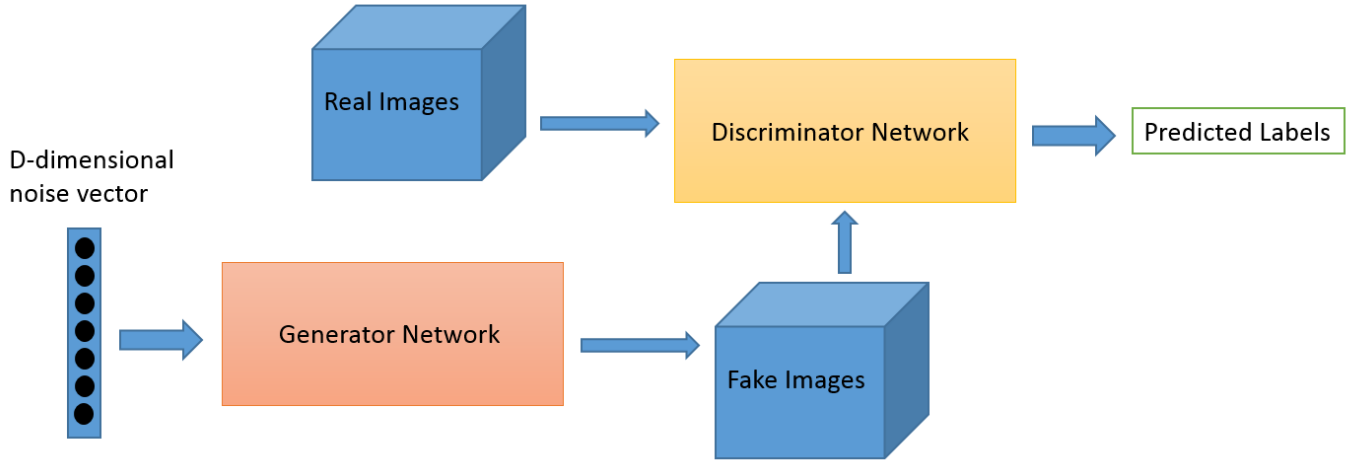
Bayesian Optimization





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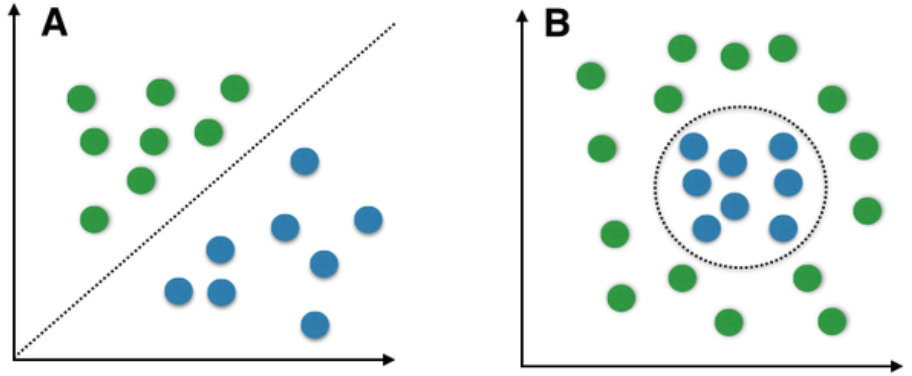

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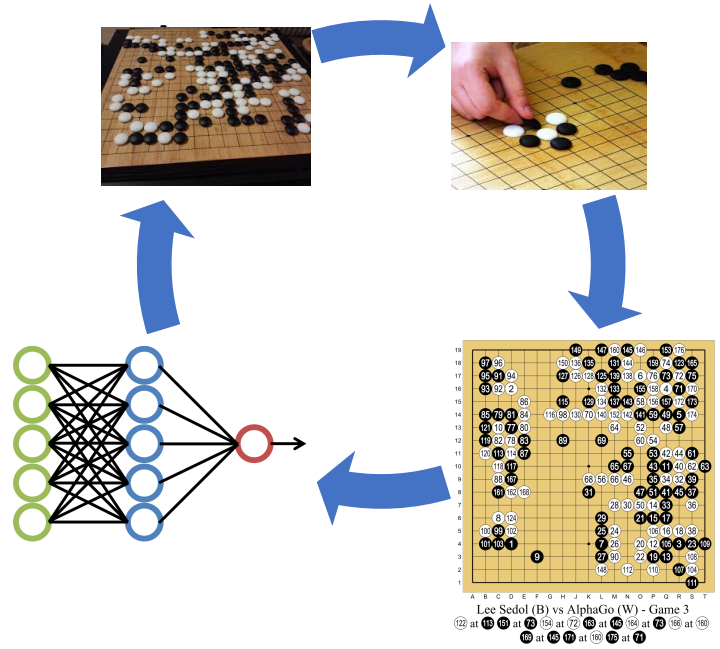

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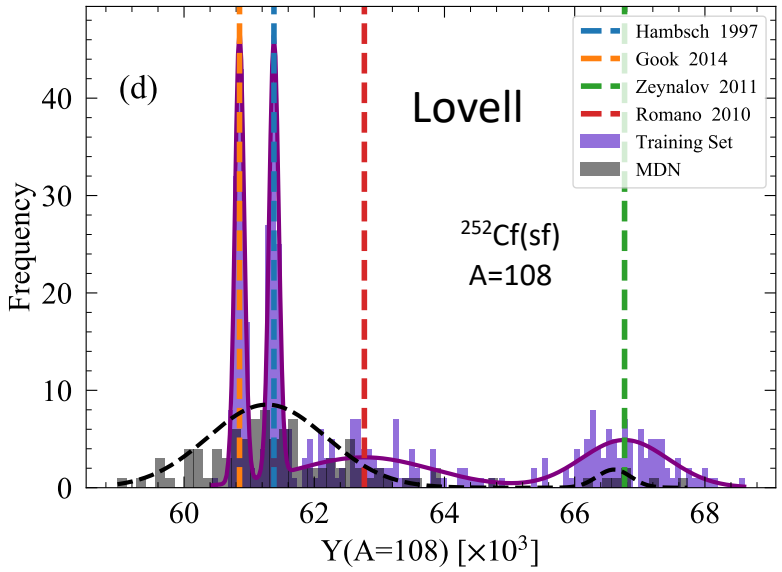
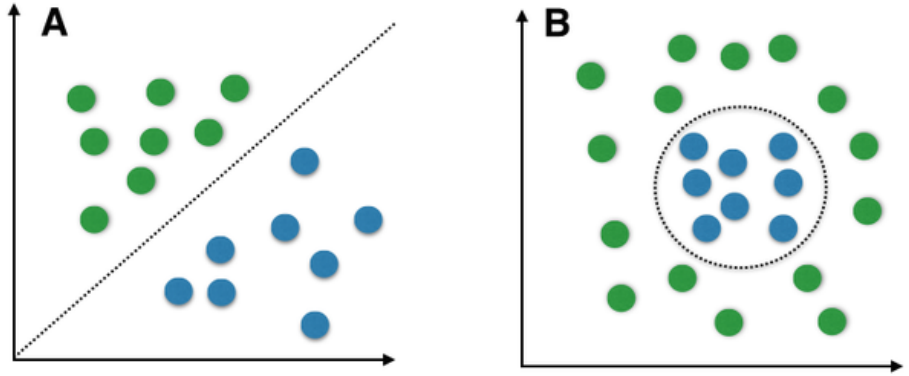


arxiv 1703.10593, 2017



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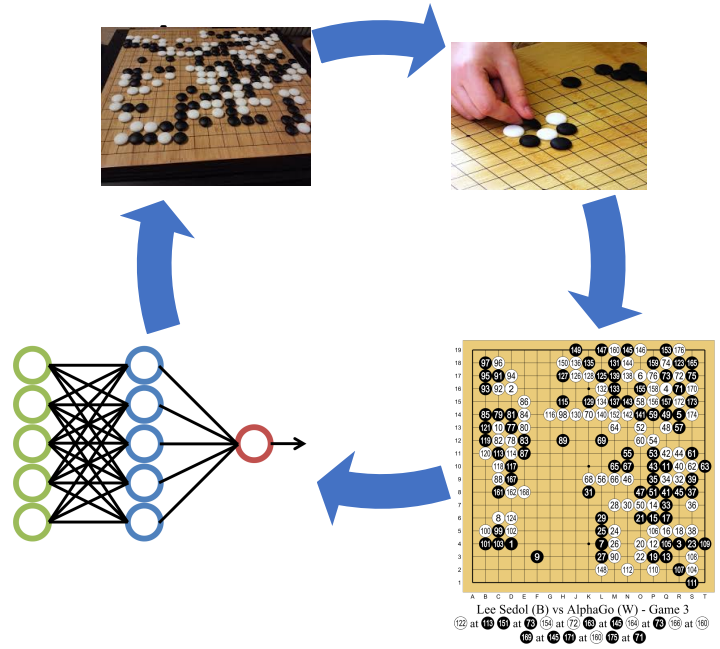

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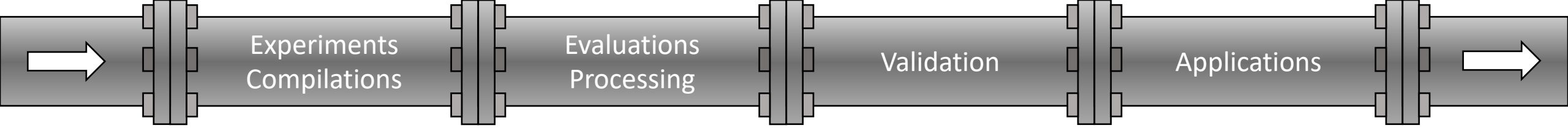
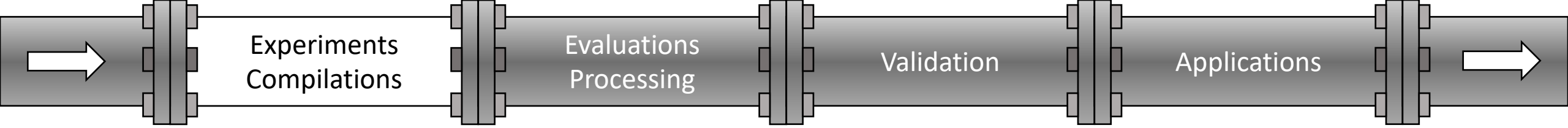


Needed Groundwork

- What common community tools are needed?
- Modernizing, documenting, and open sourcing tools
  - Improving ease of access
  - TALYS is a great example.
- Cleaning up experimental data bases
  - EXFOR
  - Adding metadata

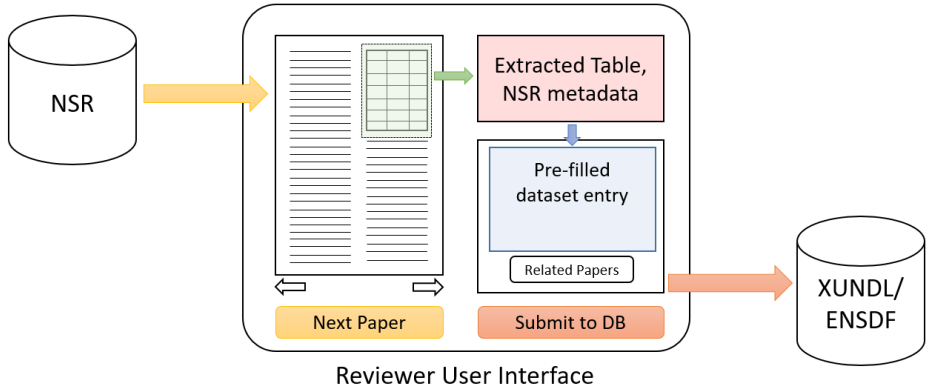
Pitfalls to be avoided

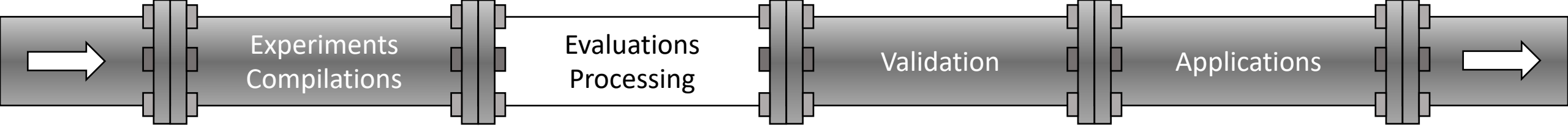
- Need to enforce reproducibility through peer review
  - ML models represented and distributed in a standard format.
- Want to augment missing physics
  - Favor better physics models over more complex ML.



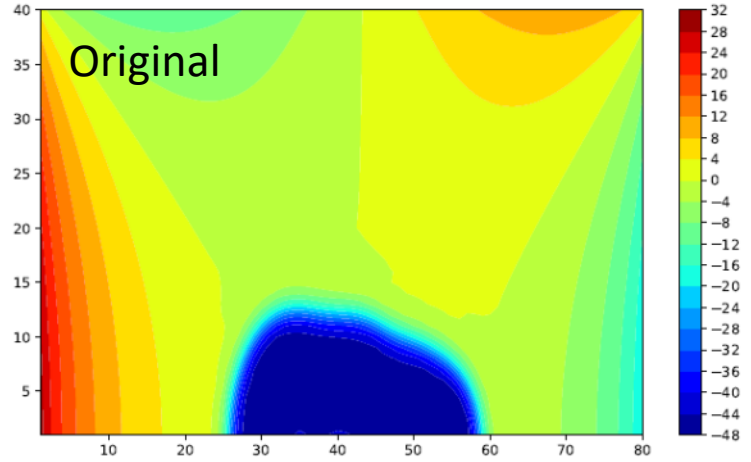
- Mitigating human error in compilation?
- Identifying and quantifying missing systematic errors
  - Can we “learn” how to correct them?
- Using ML to prioritize new measurements
- “Validating” old data

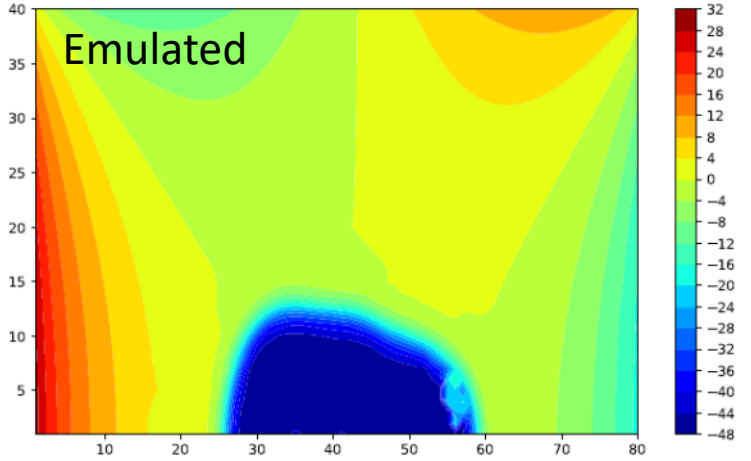
Yoo



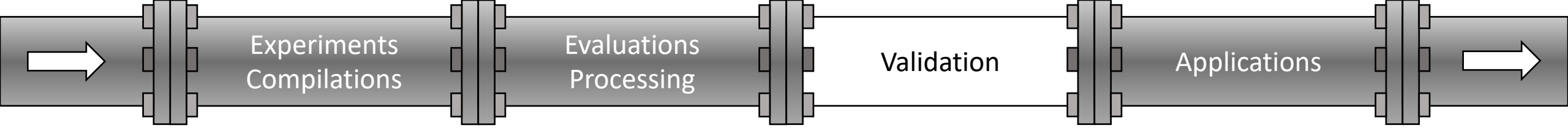


- Emulation of complex and expensive model.
- Learning model defects
  - Correcting them?
- How can we enhance evaluations with more fundamental but less precise models?
- Can we “learn” the intuition behind past evaluations.
  - Codification of senior evaluator intuition.
- Can we apply these ideas/tools to structure evaluations.



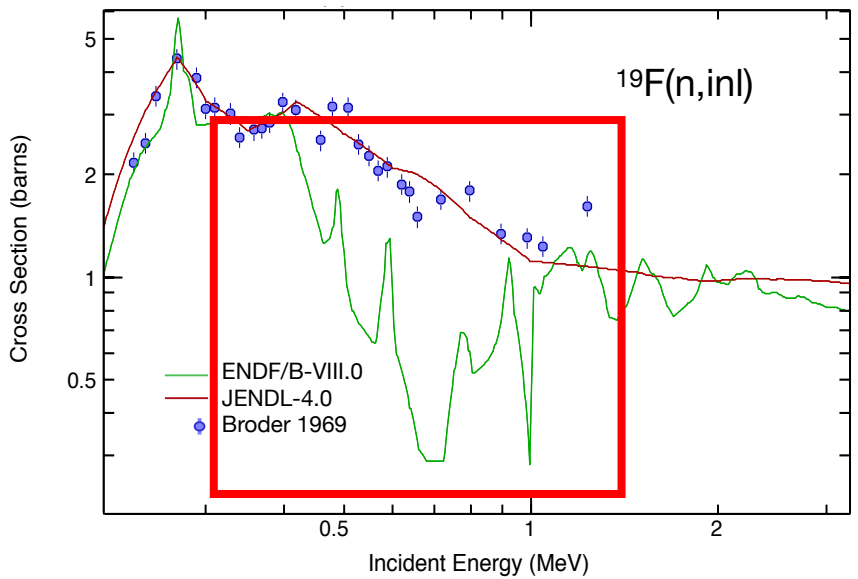


N. Schunk

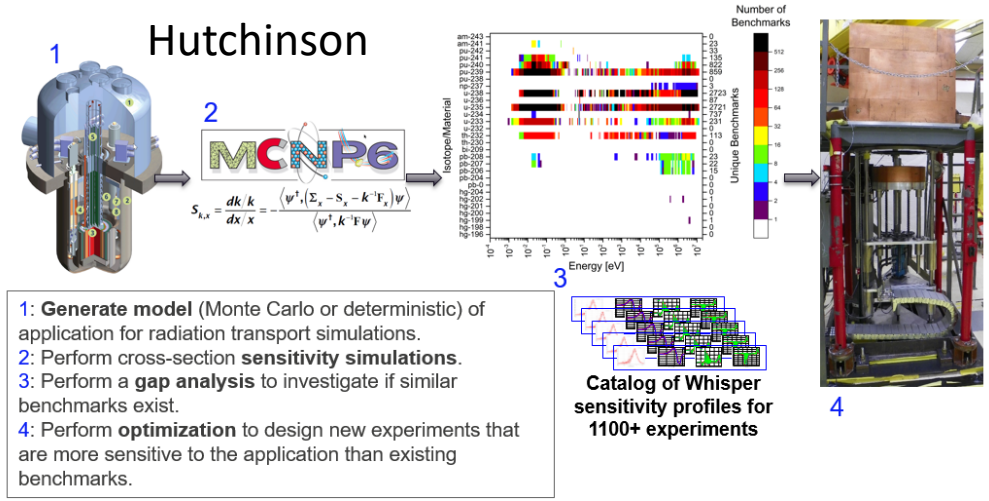


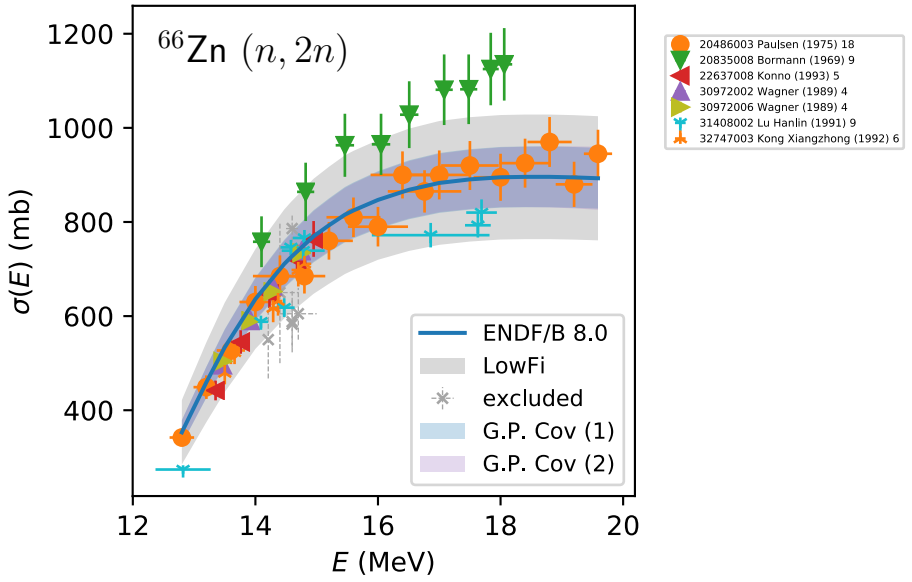
- How can we gauge the correctness of evaluations and models?
  - Does “correctness” have context?
  - What about where there is no data?
    - Very unstable systems
    - r-process
- Can we optimize new experiments to maximize new information gained?
- Can we automatic the consistency checking between models and measure data?

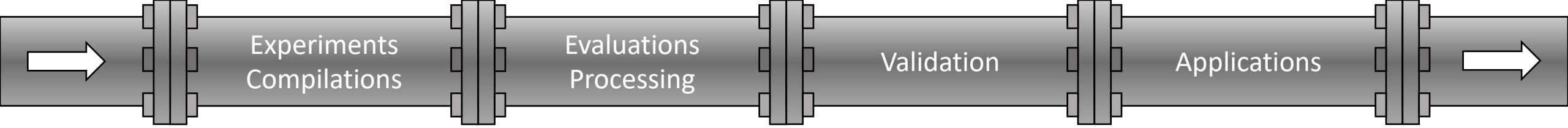
Neudecker



- Connect the (unexpectedly) important features of a reaction to particular application.
- Building application model surrogates for uncertainty propagation.
- How do we fill in gaps of missing information needed by applications







Discussion Time!

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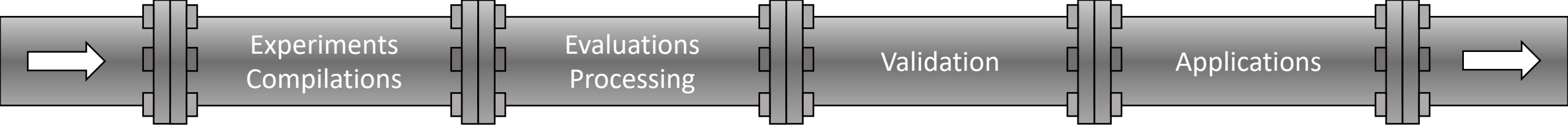

- How to address having very little data.
  - What is really needed to train a ML model.
- Virtues of expt. data only vs including model data.
- Cautions when physics is unknown.
- Caution when fitting GP (collapsing length scales).

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