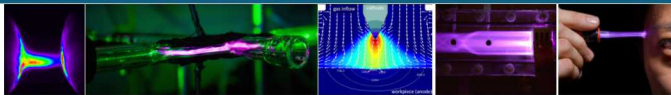


This paper describes objective technical results and analysis. Any subjective views or opinions that might be expressed in the paper do not necessarily represent the views of the U.S. Department of Energy or the United States Government.

 Laboratories

SAND2018-7700C

Plasma Diagnostics, Modeling, and Control



PRESENTED BY

Zak Eckert



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4 August 2018





Applications

Quantity of Interest in
the Application Space



Applications

PAC

Quantity of Interest in
the Application Space

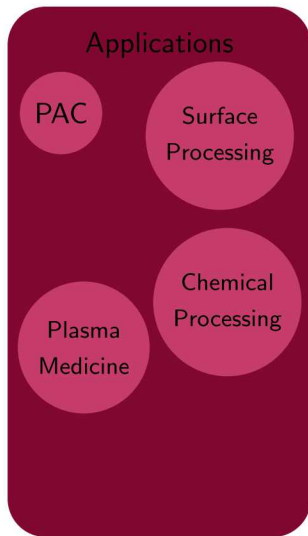


Applications

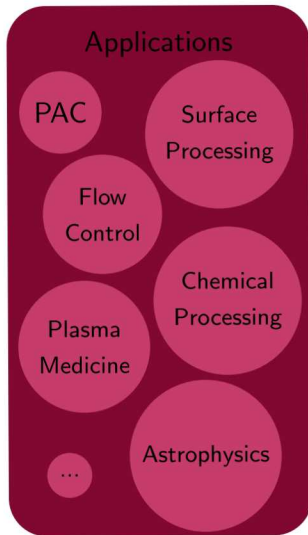
PAC

Plasma
Medicine

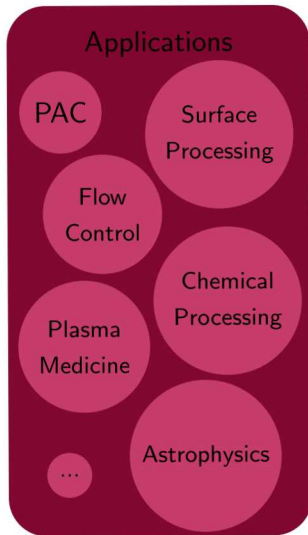
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Plasma Physics

Excited State
Chemistry

Particle-Surface
Interaction

Electromagnetics

Non-equilibrium
Thermodynamics

...

Quantity of Interest Depends
on the Underlying Physics



Applications

PAC

Surface
Processing

Flow
Control

Plasma
Medicine

Chemical
Processing

Astrophysics

...

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Chemistry

Particle-Surface
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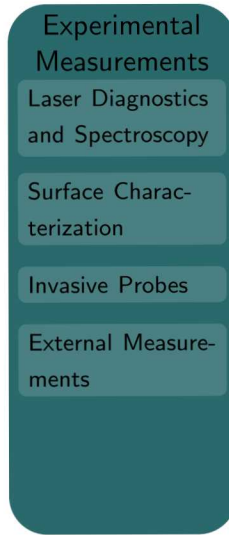
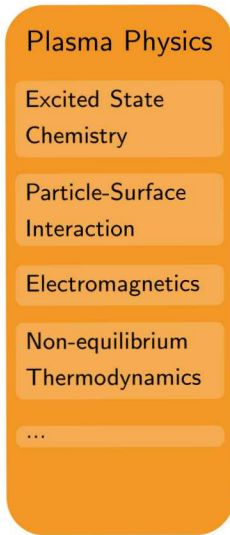
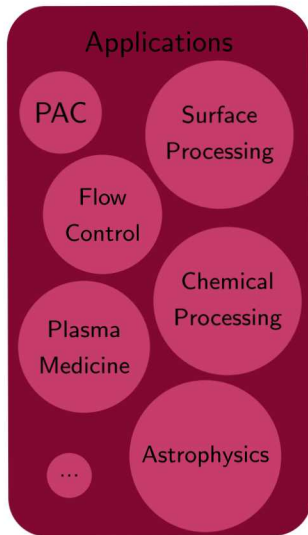
Electromagnetics

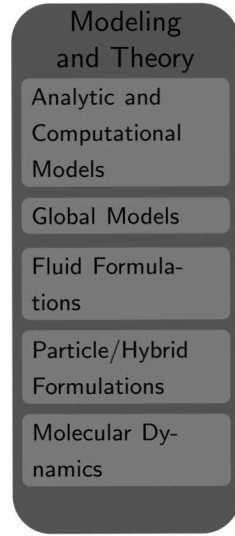
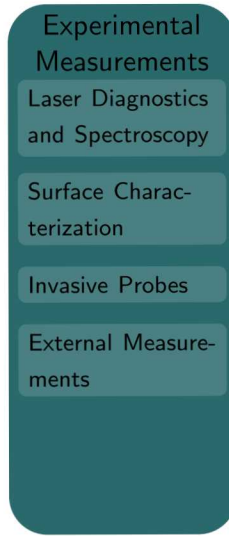
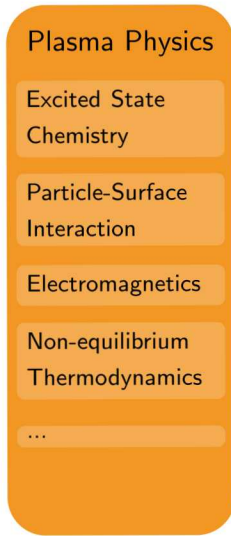
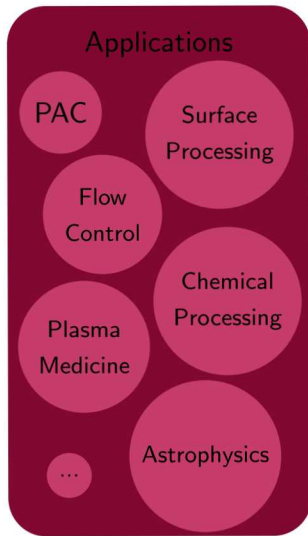
Non-equilibrium
Thermodynamics

...

Experimental Measurements

Modeling and Theory







Experimental Measurements

Modeling and Theory



Experimental Measurements

Langmuir Probes in the Ionosphere

Modeling and Theory



Experimental Measurements

Langmuir Probes in the Ionosphere

Second Harmonic Generation E-Field Measurements

Modeling and Theory



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Sum Frequency Generation for Liquid-Plasma Interface Measurements

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More Powerful and Cheaper Computers



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New Theories and Reduced Order Models
(e.g. SLPIC)



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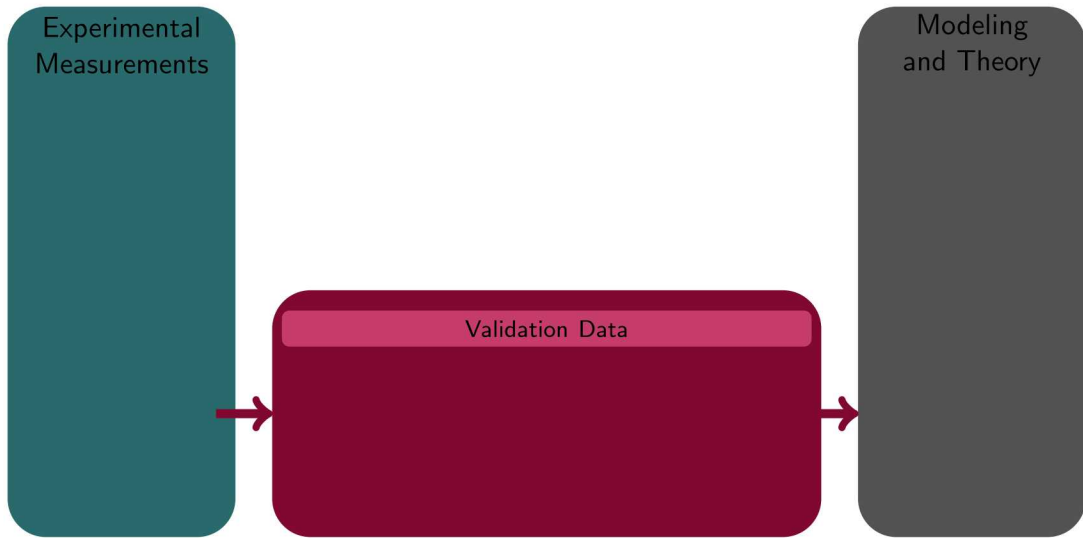
- ▶ New diagnostics/models are expensive and time consuming to build
- ▶ Leads to many researchers with powerful but relatively narrow capabilities
- ▶ Increases the importance of collaboration

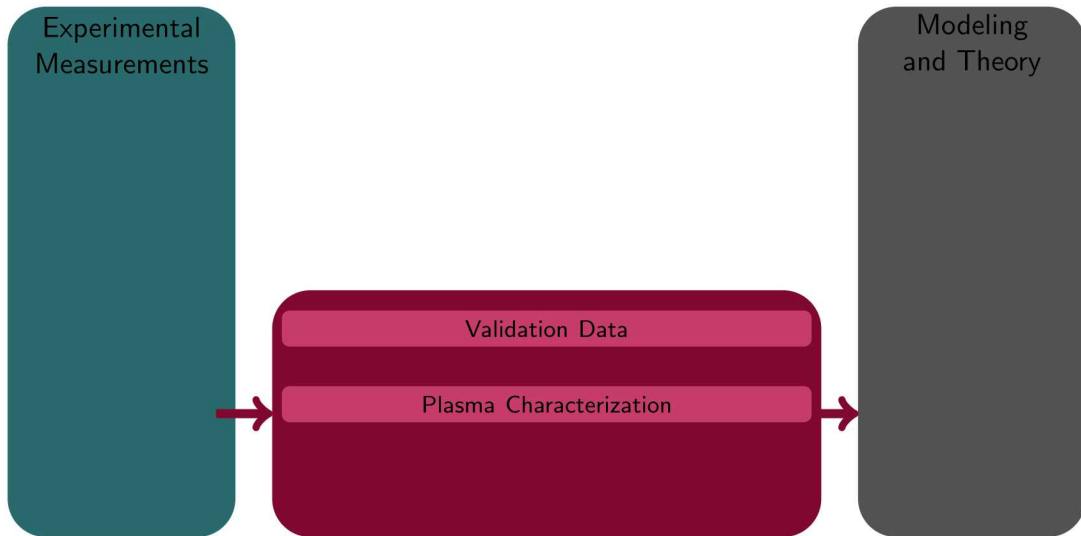
Synergy of Measurements and Modeling



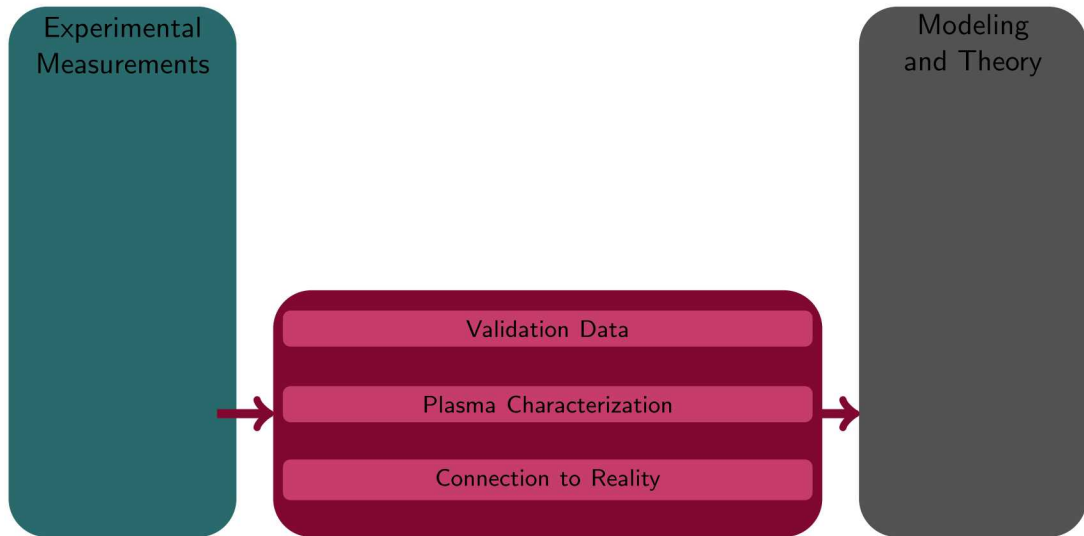
Experimental
Measurements

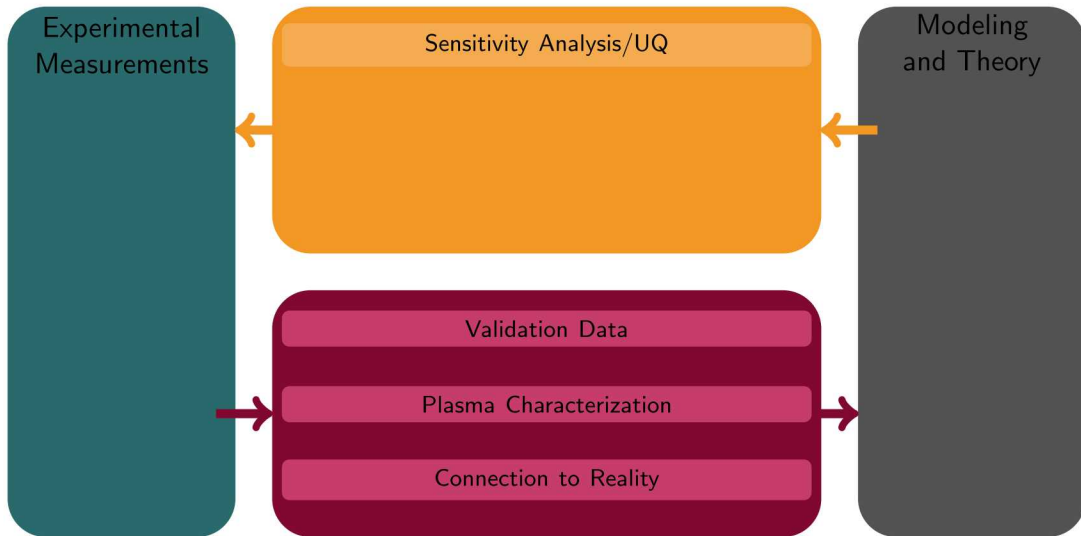
Modeling
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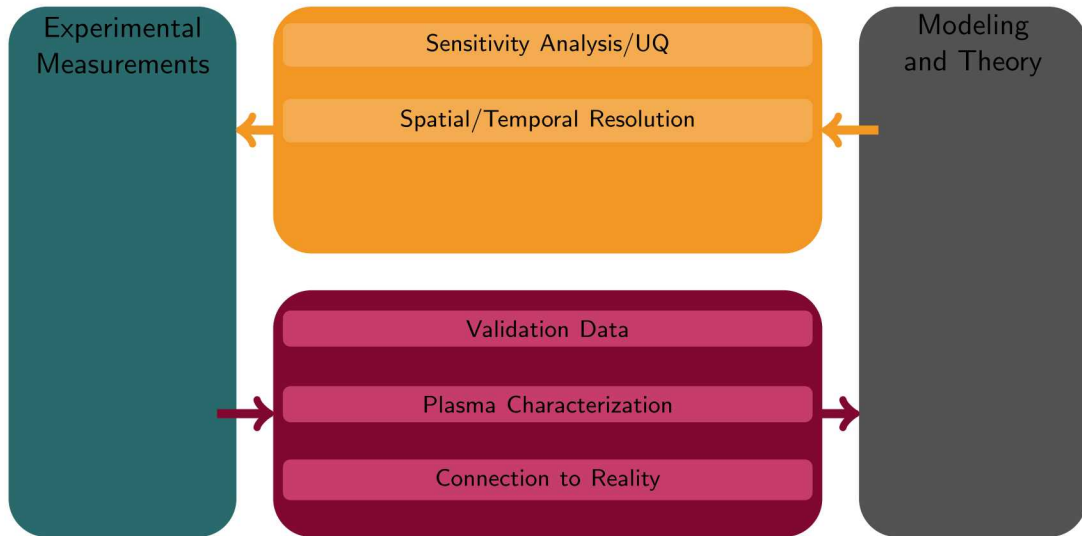


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