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Big Data
For Simulations of Extreme & Environmental Flows

S. Balachandar

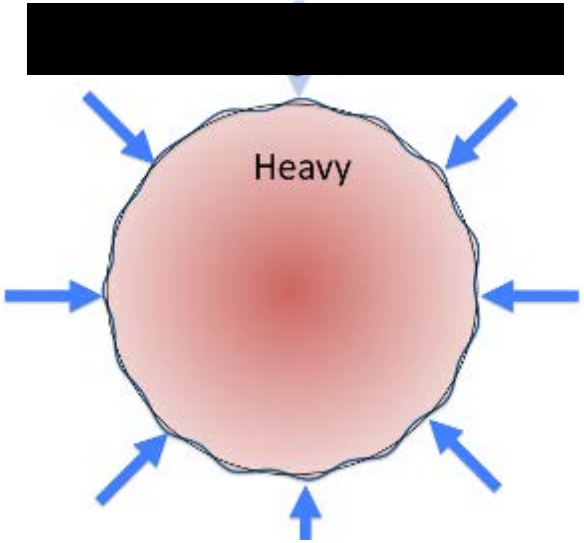
Computational Multi-Physics

Institute for Computational Engineering

Department of Mechanical and Aerospace Engineering

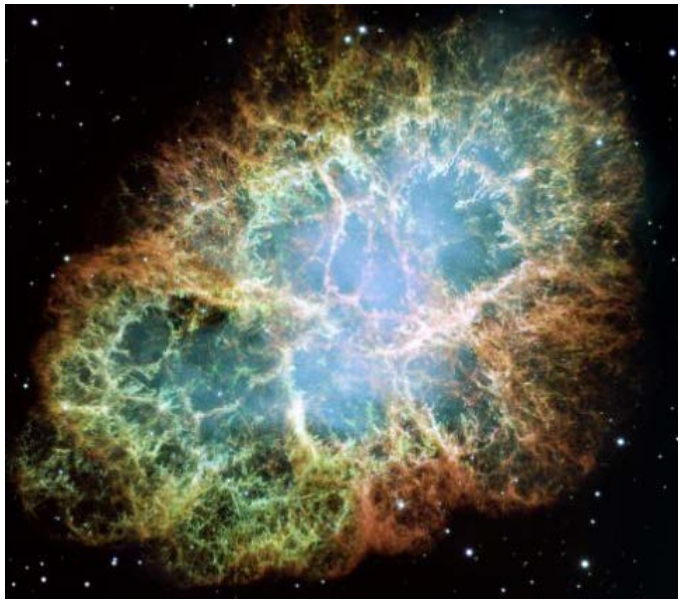
Example Problems of Interest

Volcanic Eruption

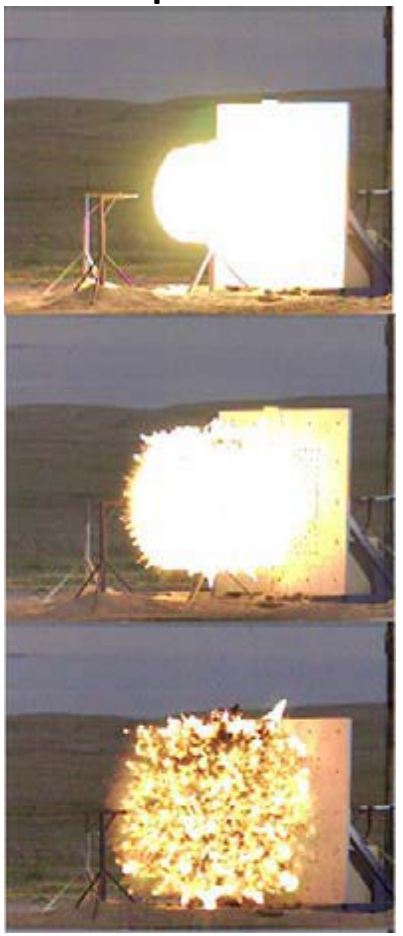


Debris, Pyroclastic, Avalanche Flows

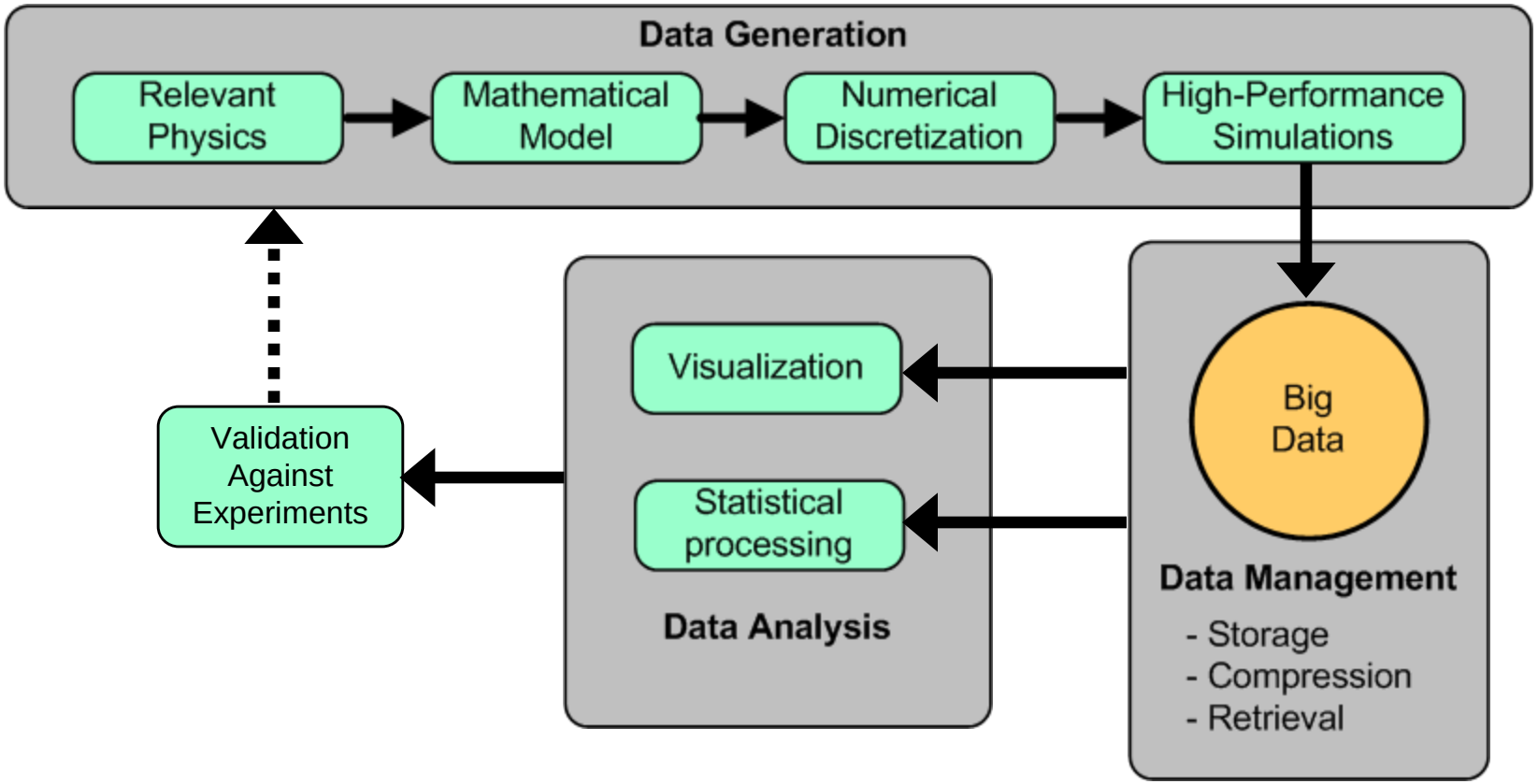
Supernovae



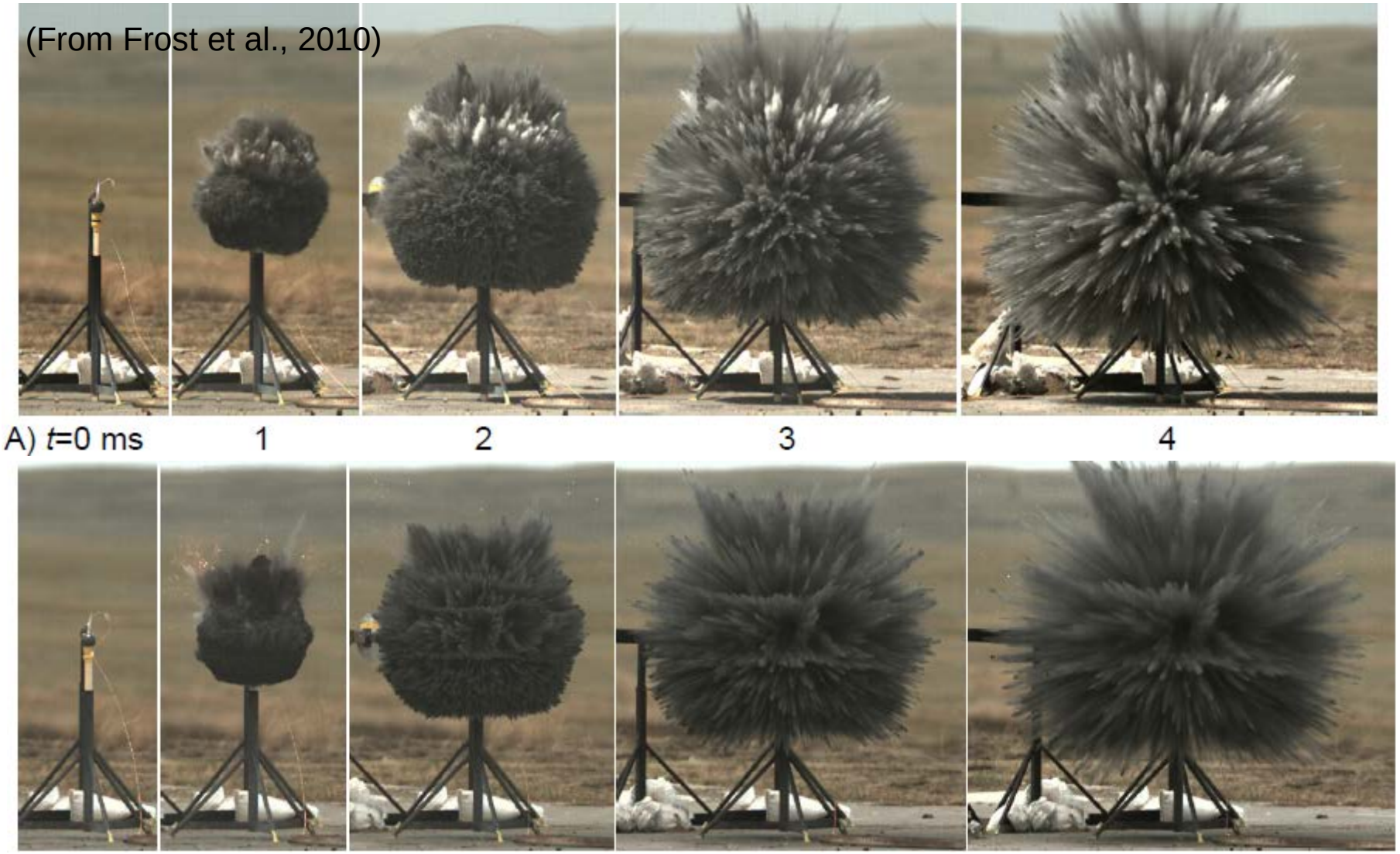
Multiphase/Hybrid Fuel-air Explosives



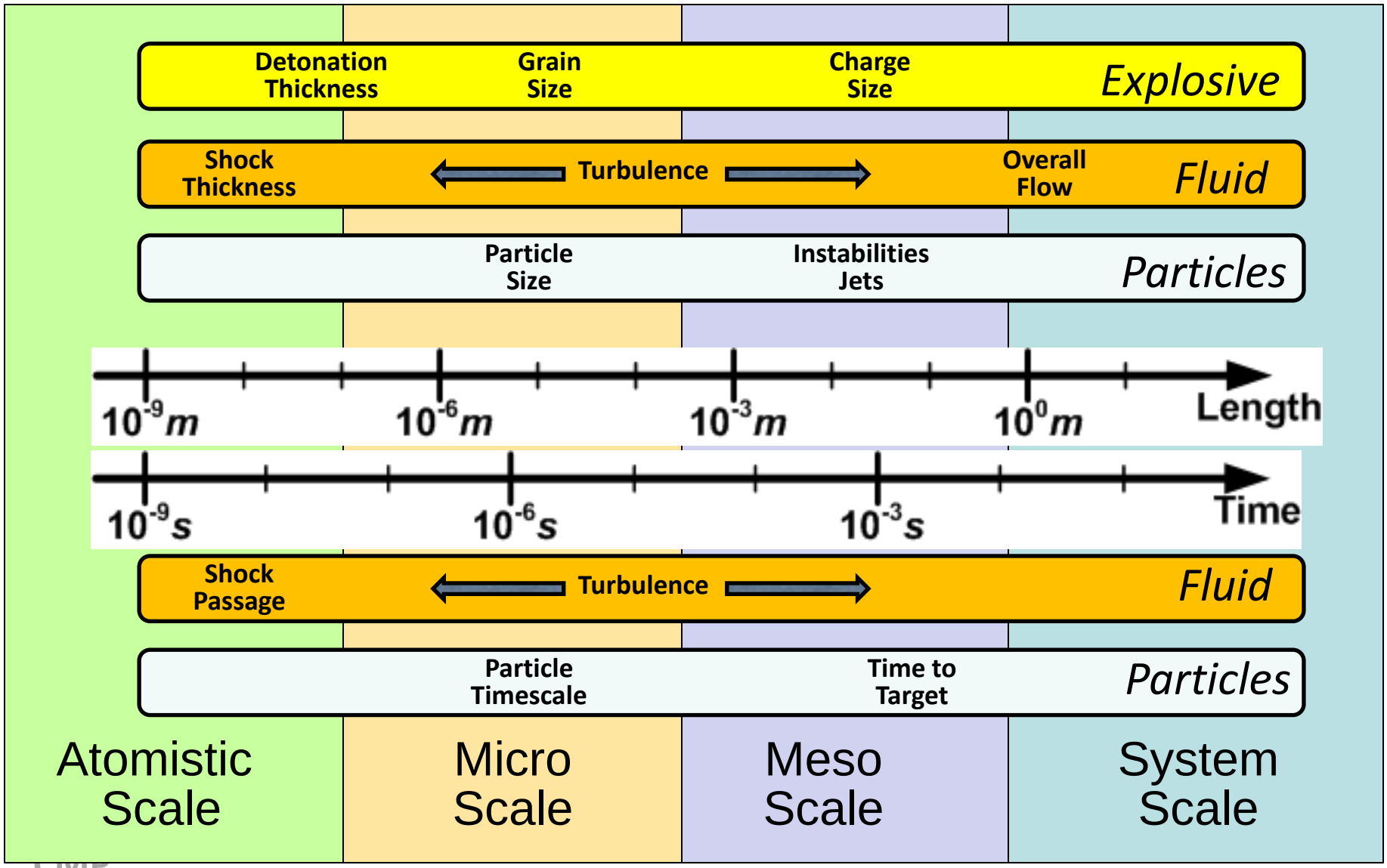
“Big Data” Cycle For Us



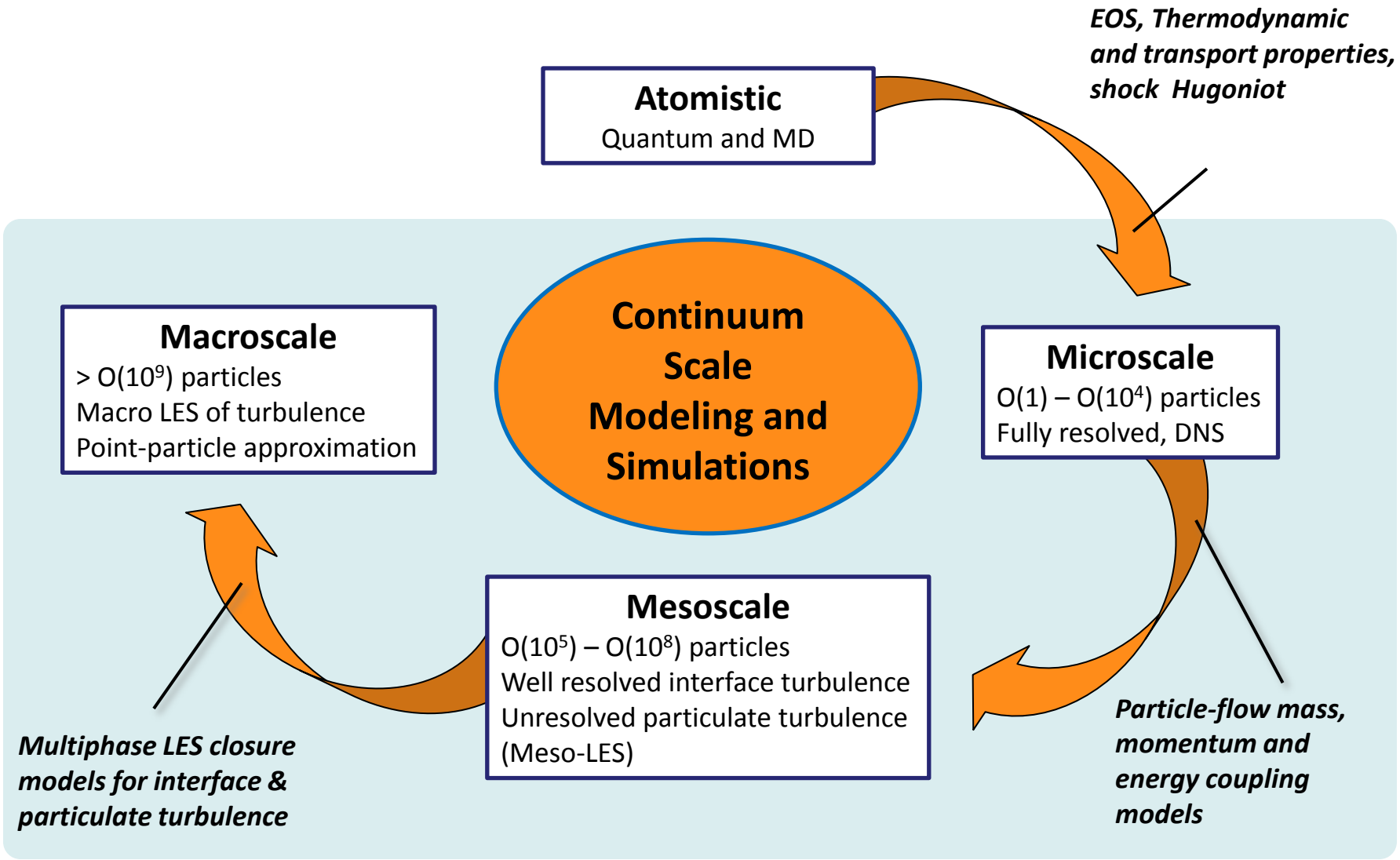
A typical Experiment We Wish to Simulate



Multiscale Problem – A Real Challenge



Multiscale Coupling Strategy



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Estimated Computing Resources

Peta-scale need for "Data Generation"

Year	Number of Cores	Core-Hours	Disk Space (TB)
Now	50,000	10^8	500
+1	300,000	5×10^8	3,000
+2	500,000	1.5×10^9	10,000
+3	1,000,000	3×10^9	18,000
+4	2,000,000	8×10^9	25,000
+5	5,000,000	2×10^{10}	50,000

In 5 years we will need Exascale Compute power

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Big Data Challenges/Opportunities @ UF

- Access to large parallel compute platforms
  - Parallel runs on at least $O(10^3)$ nodes
  - Homogenous nodes is highly desired
- Job queues that allow and favor such large runs
- Access to future many-core and heterogeneous nodes
- Large data storage to process the outputs
- We need HPC expertise in petascale simulation, visualization, data compression, statistical processing

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Questions?

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