

Predictive Simulations of nvPM Aircraft Emissions

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Cost Share Partners: ¹Georgia Institute of Technology, ²University of Michigan, and ³Raytheon Technology Research Center.

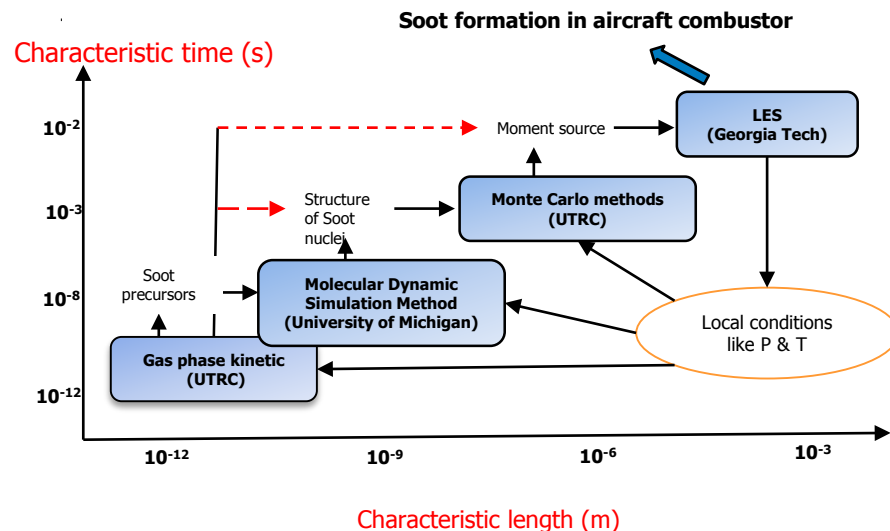
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Objective:

- Reliable soot kinetics for complex polyaromatic hydrocarbons (PAHs) jet-fuel systems
- Develop a new model for nanoparticle inception
- Link kinetics and particle inception to growth models
- Apply models within large-eddy simulations (LES)

Project Benefits:

- Predictive model for aeroengine combustor emission
- New predictive inception and growth models for soot formation in PAHs dominated fuels
- New CFD to simulate emission from flames using these multi-scale models



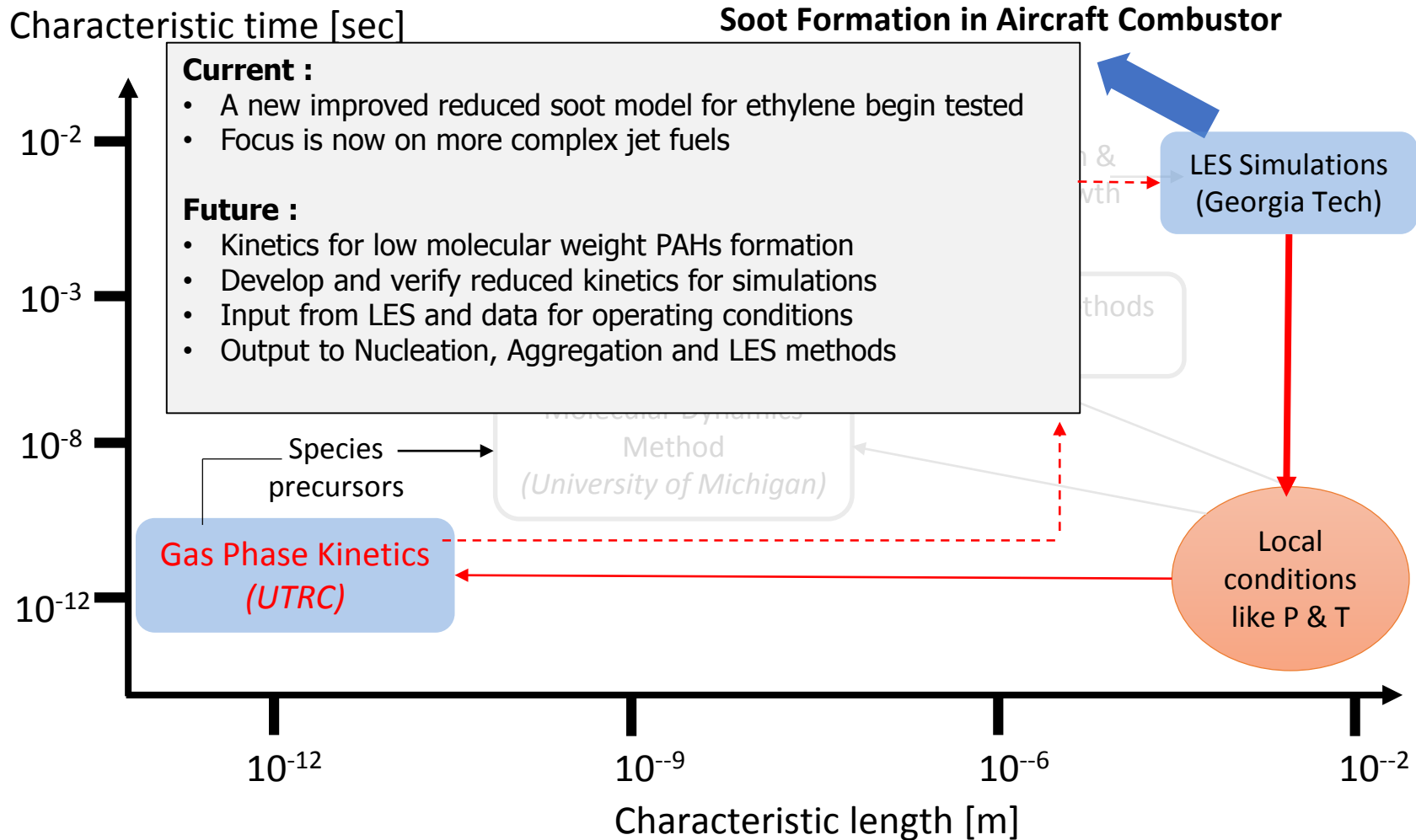
Major Accomplishments:

- Developed integrated surface-growth and aggregation model for post-inception particle growth
- Identified major PAHs from the gas-phase for molecular simulations.
- LES-Method of Moment (LESMOM for canonical turbulent combustion to evaluate new models

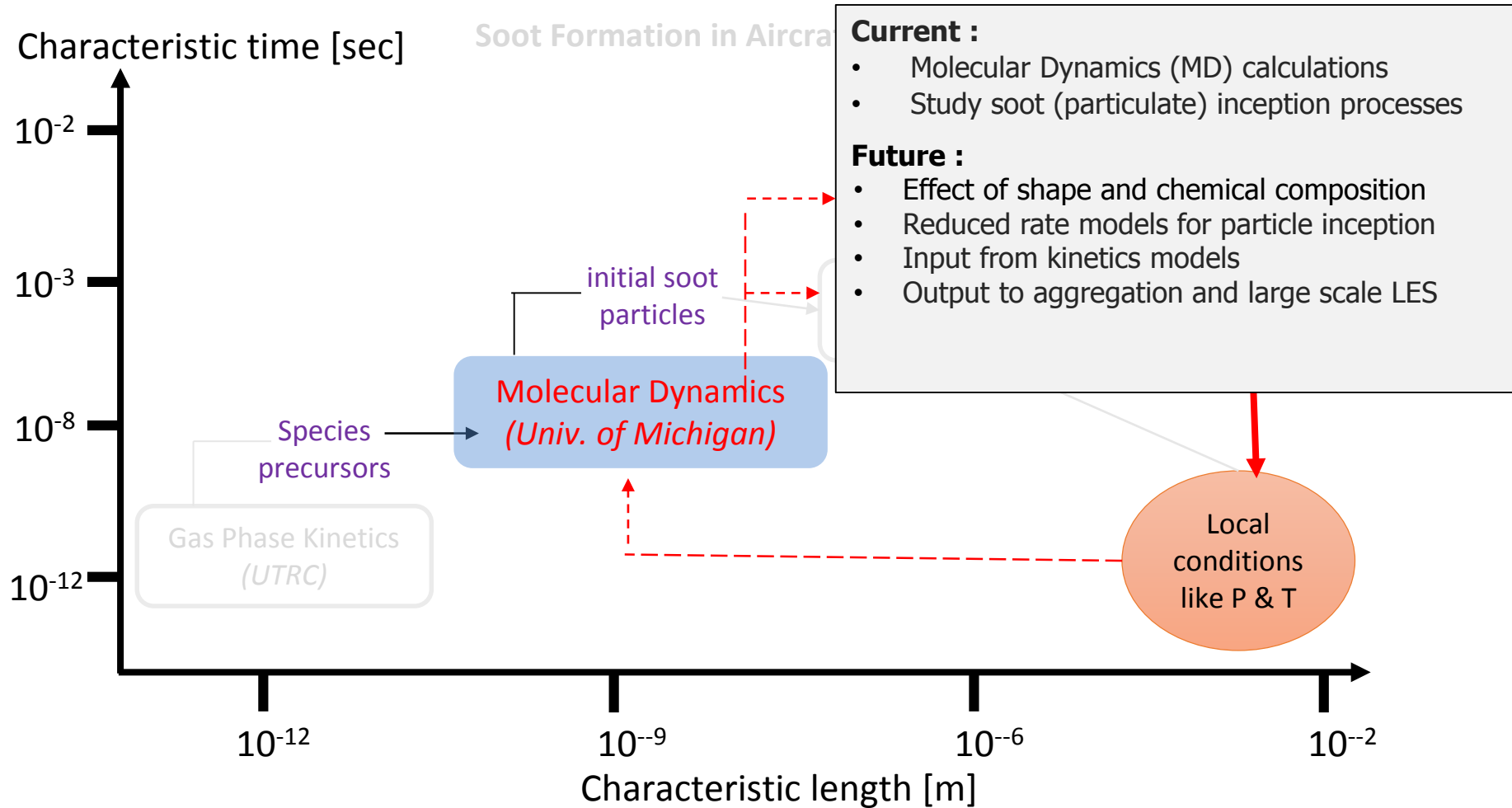
Future Work / Schedule (2-Year Plan):

- Complete validation of PAH based soot kinetics
- Couple particle growth model with nucleation and inception-growth mode with validation
- Reduced models for LES application
- To LES of canonical and relevant problems

Kinetics of Soot formation



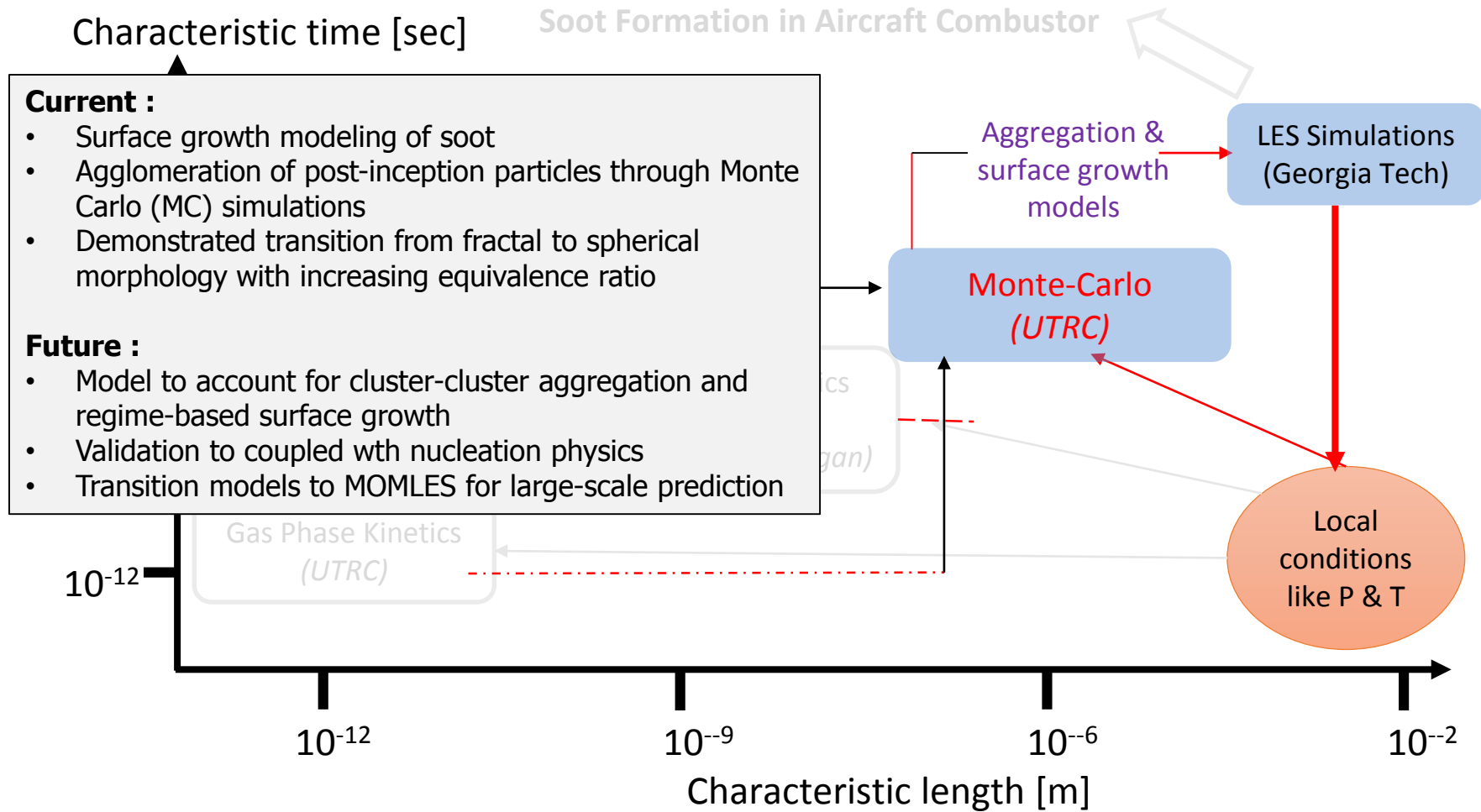
Particle Inception from Gas-phase Species



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Saldinger, Elvati, and Violi, *Phys. Chem. Chem. Phys.*, 2021, 23, 4326.

Post-inception growth of particles



Large-scale soot combustion in LES

Soot Formation in Aircraft Combustor

