

Multiphysics Simulation and Modeling of Powder Coating Processes



SAMCE 2021 Fall Series, Ignite Talk, Online

16th Nov 2021, G. Boiger, B. Siyahhan, M. Boldrini, D. Sharman

The fascination of seeing more than meets the eye...





Infinite Diversity in Infinite Combinations...

Vulcan Proverb ☺

Powder Coating Process: So much more than meets the eye...

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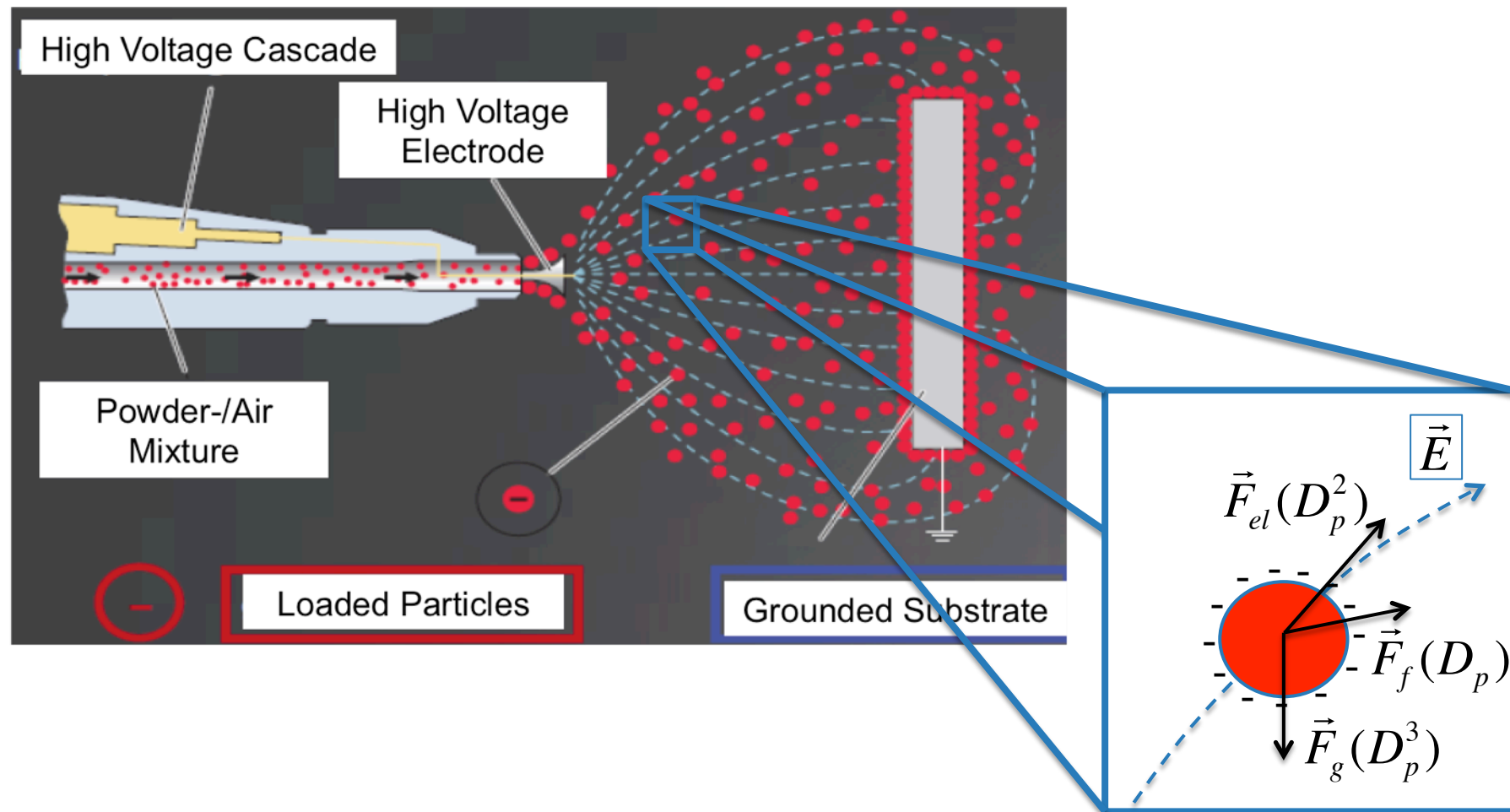


Why simulate a process that already works?

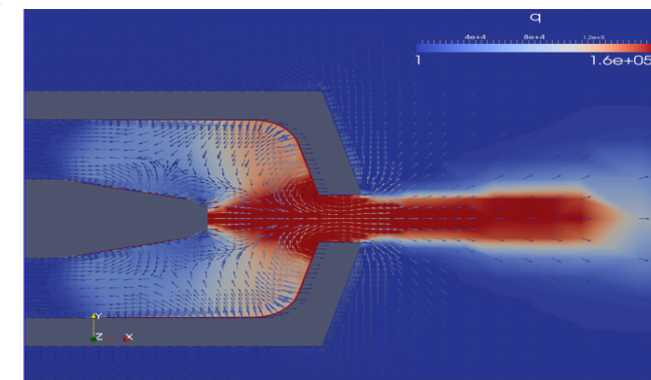
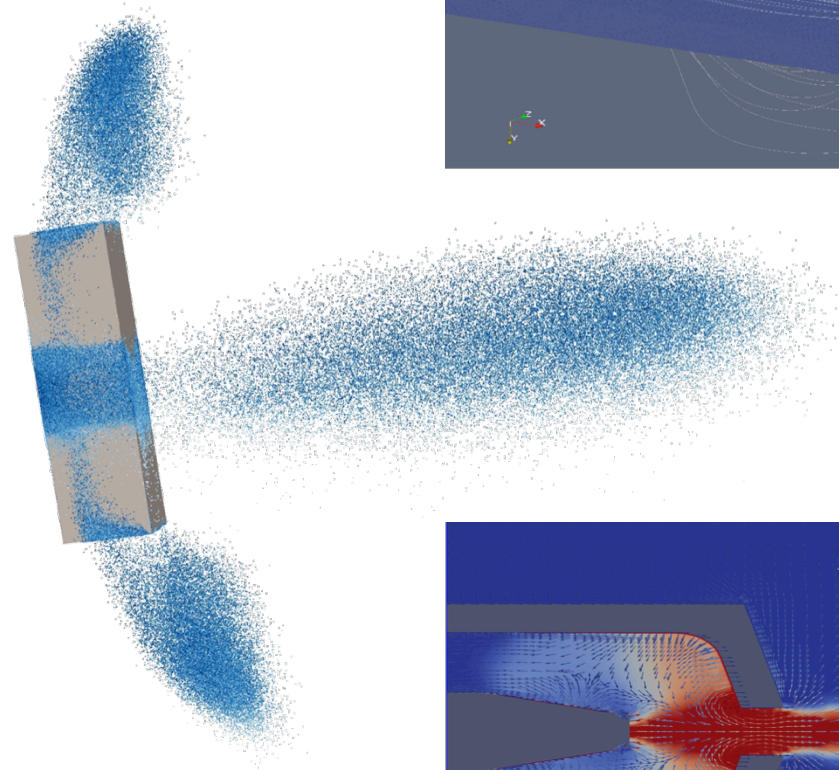
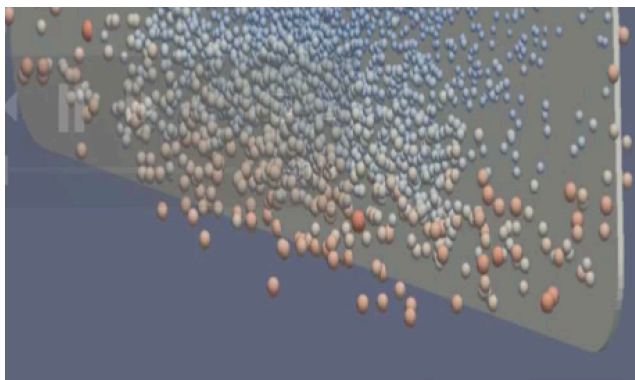
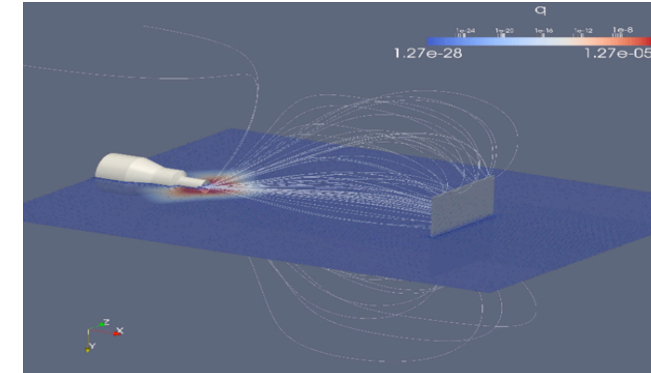
- ... to increase quality
- ... to increase efficiency
- ... to replace trial and error based development

So what does it take?

1st Step: Physical Analysis



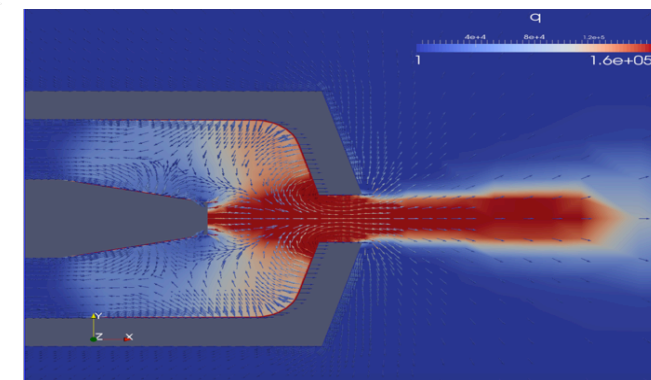
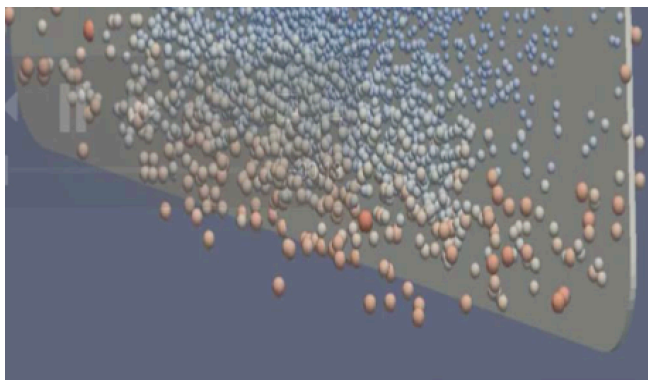
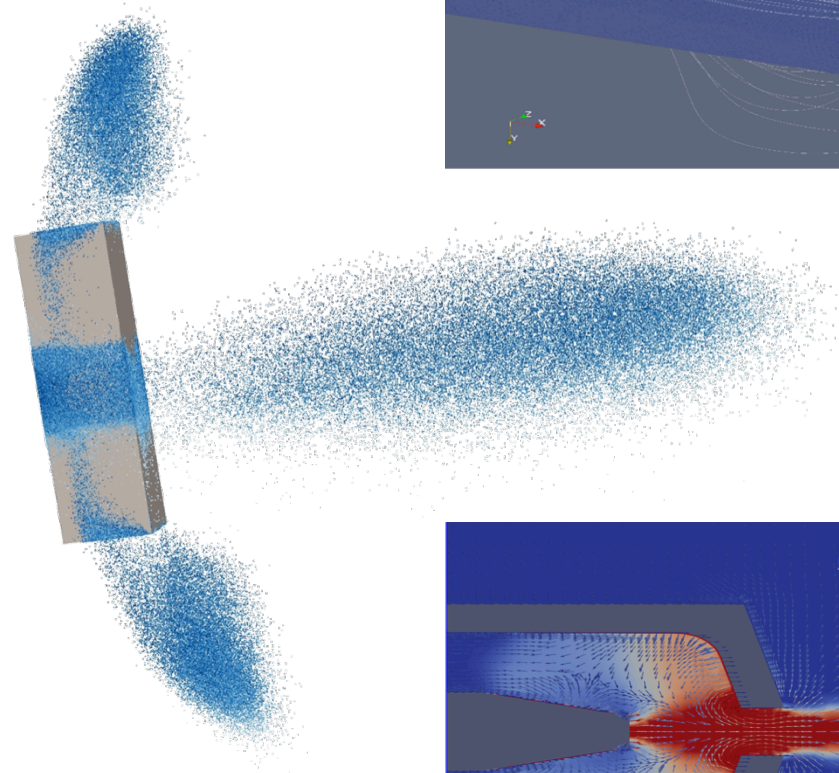
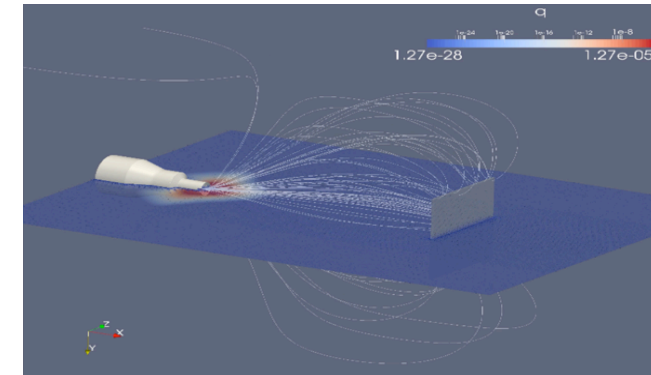
2nd Step: Qualitative Modelling / Puzzle Pieces



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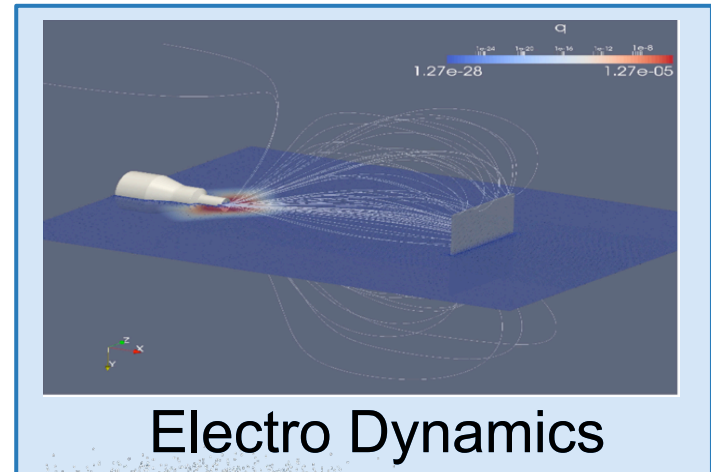
Fluid Dynamics



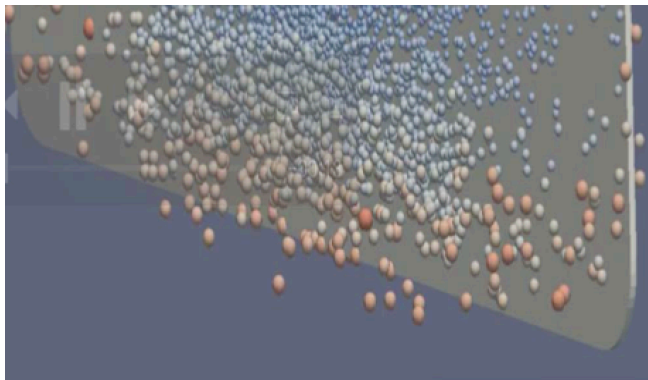
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Fluid Dynamics



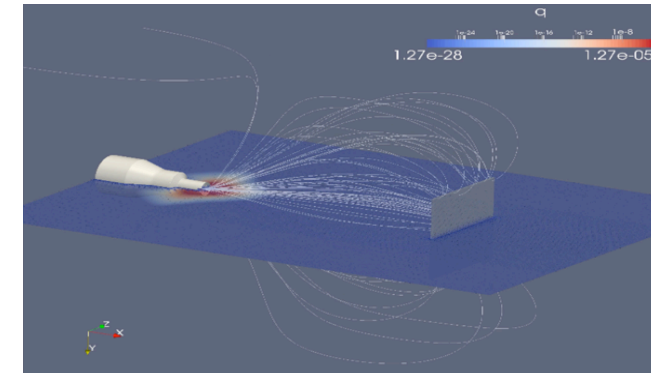
Electro Dynamics



2nd Step: Qualitative Modelling / Puzzle Pieces

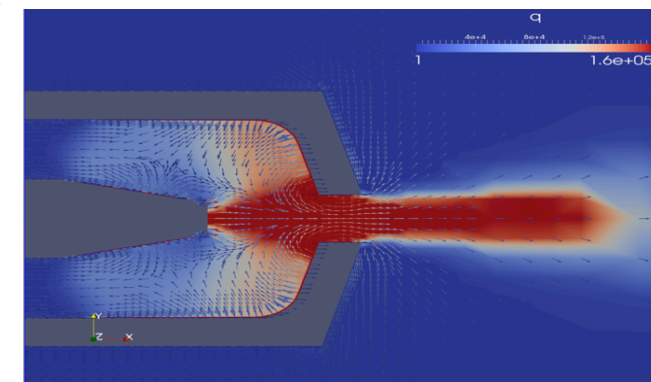
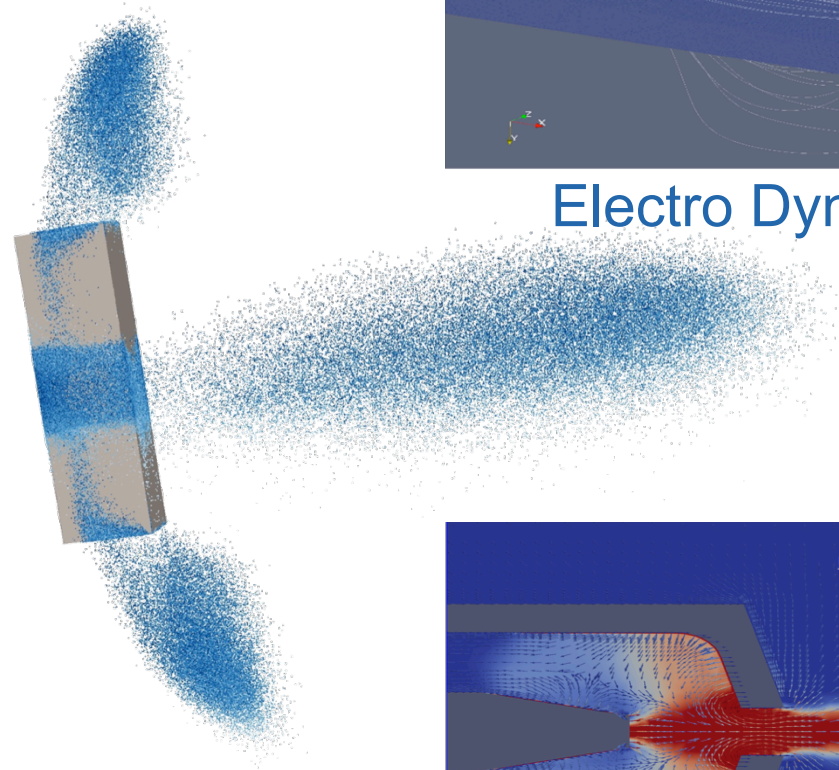
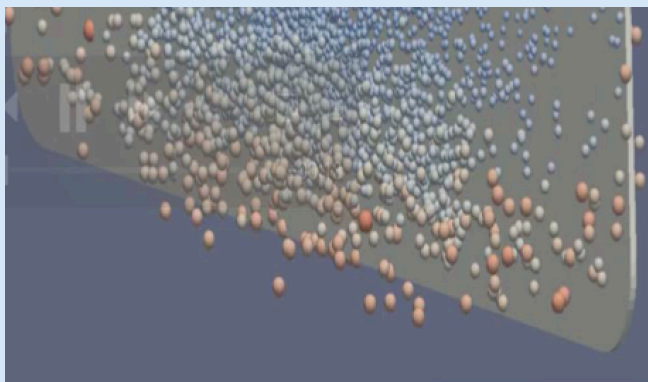


Fluid Dynamics



Electro Dynamics

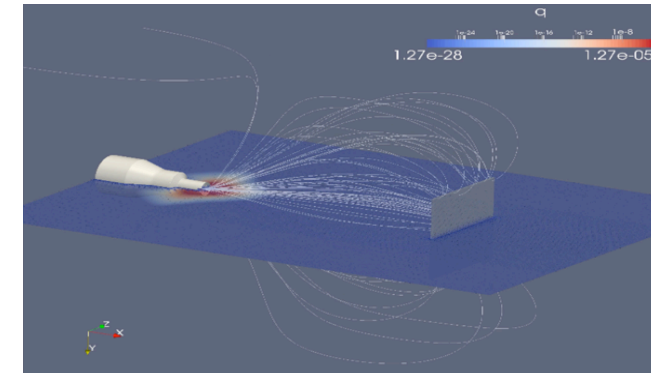
Particle Dynamics



2nd Step: Qualitative Modelling / Puzzle Pieces

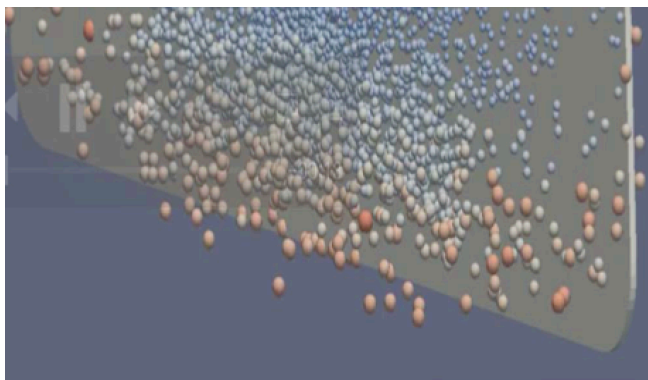


Fluid Dynamics

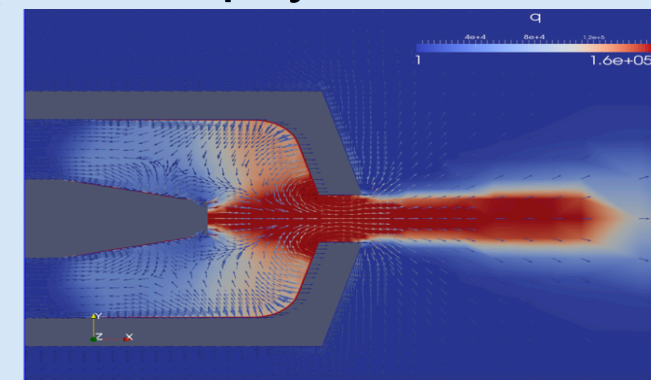


Electro Dynamics

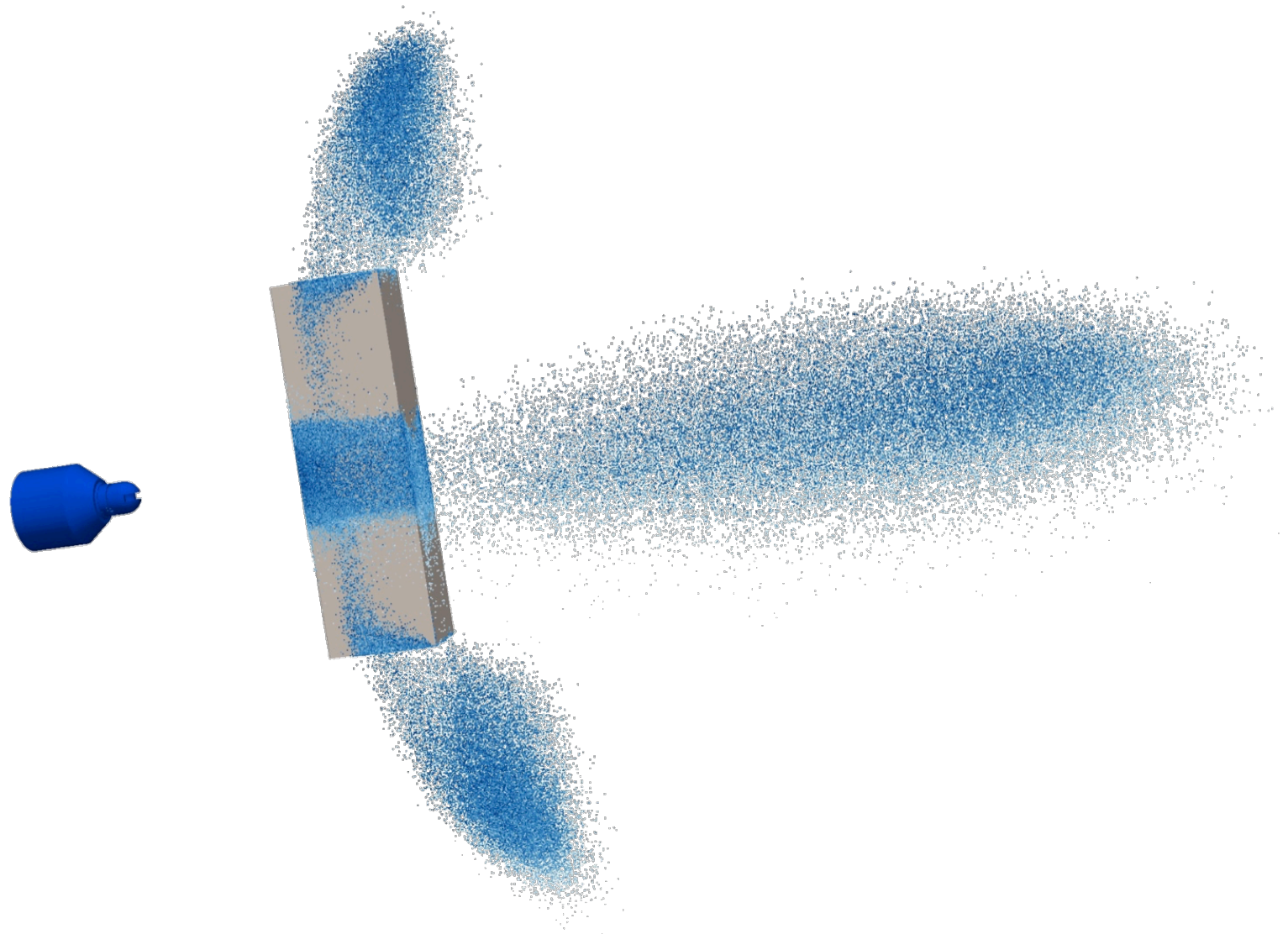
Particle Dynamics



Multiphysics Effects



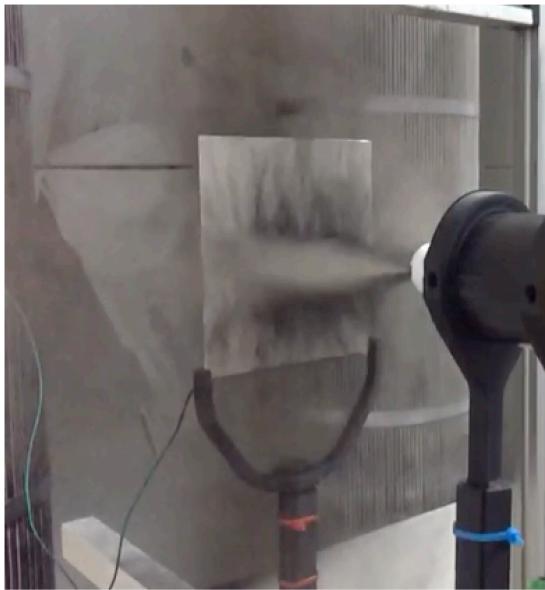
2nd Step: Qualitative Modelling / Puzzle Pieces



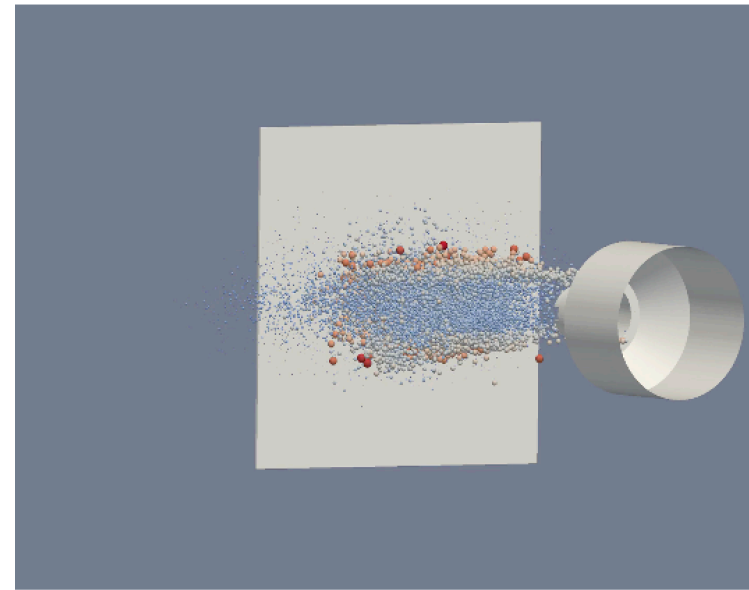
3rd Step: Validation

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Experiment

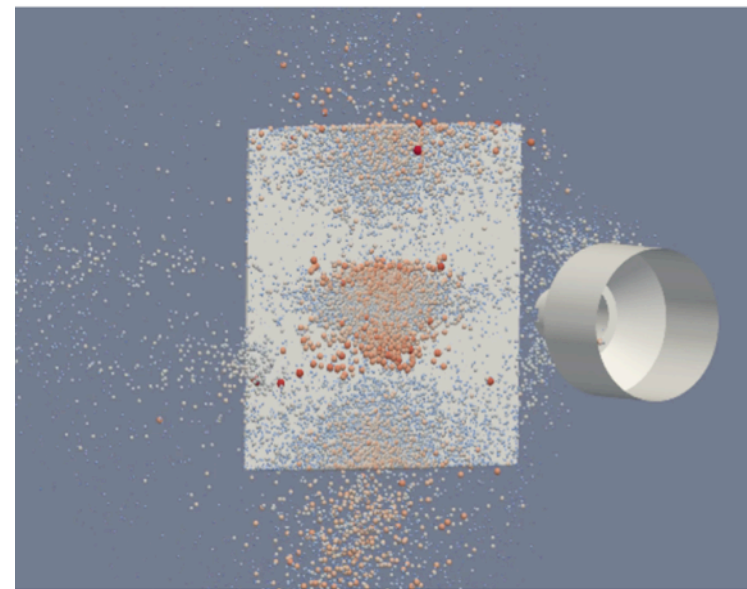


Simulation

3rd Step: Validation



Experiment

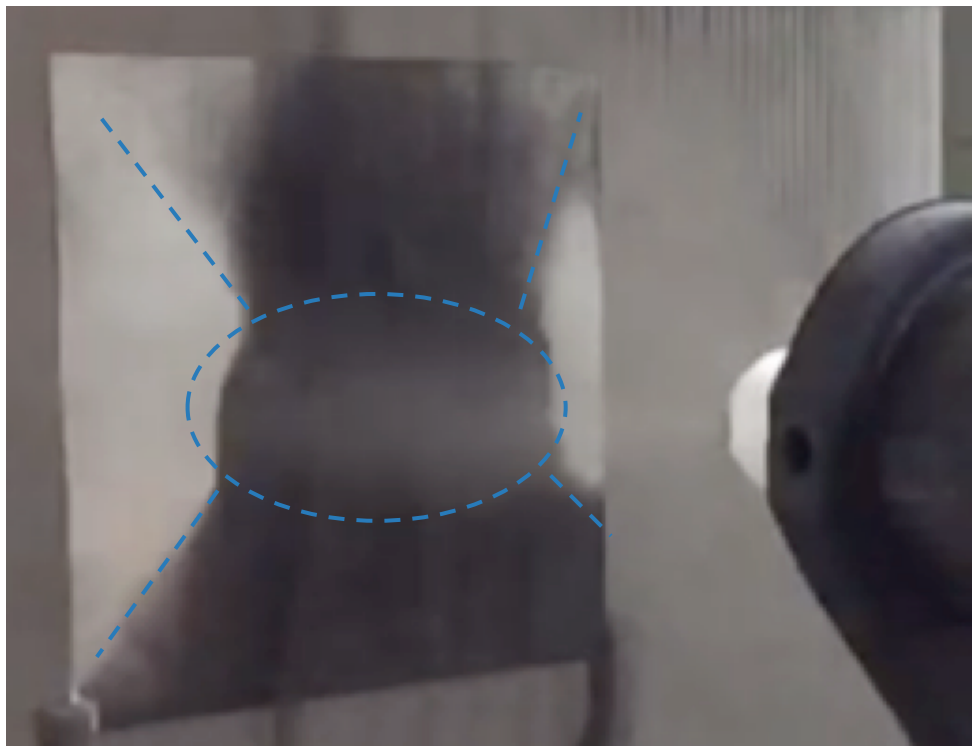


Simulation

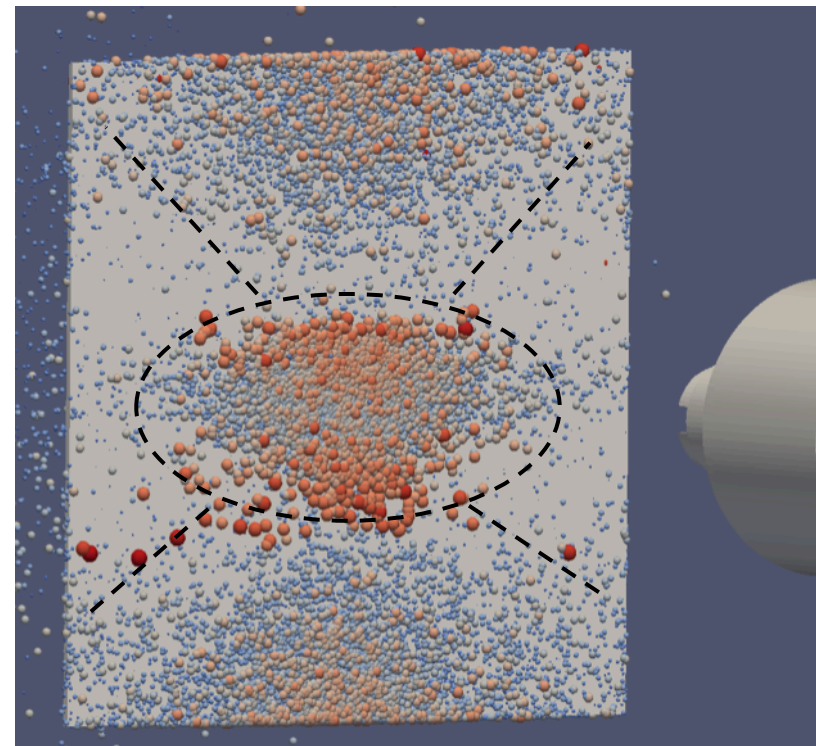
3rd Step: Validation

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Experiment



Simulation

4th Step: Appreciate Diversity



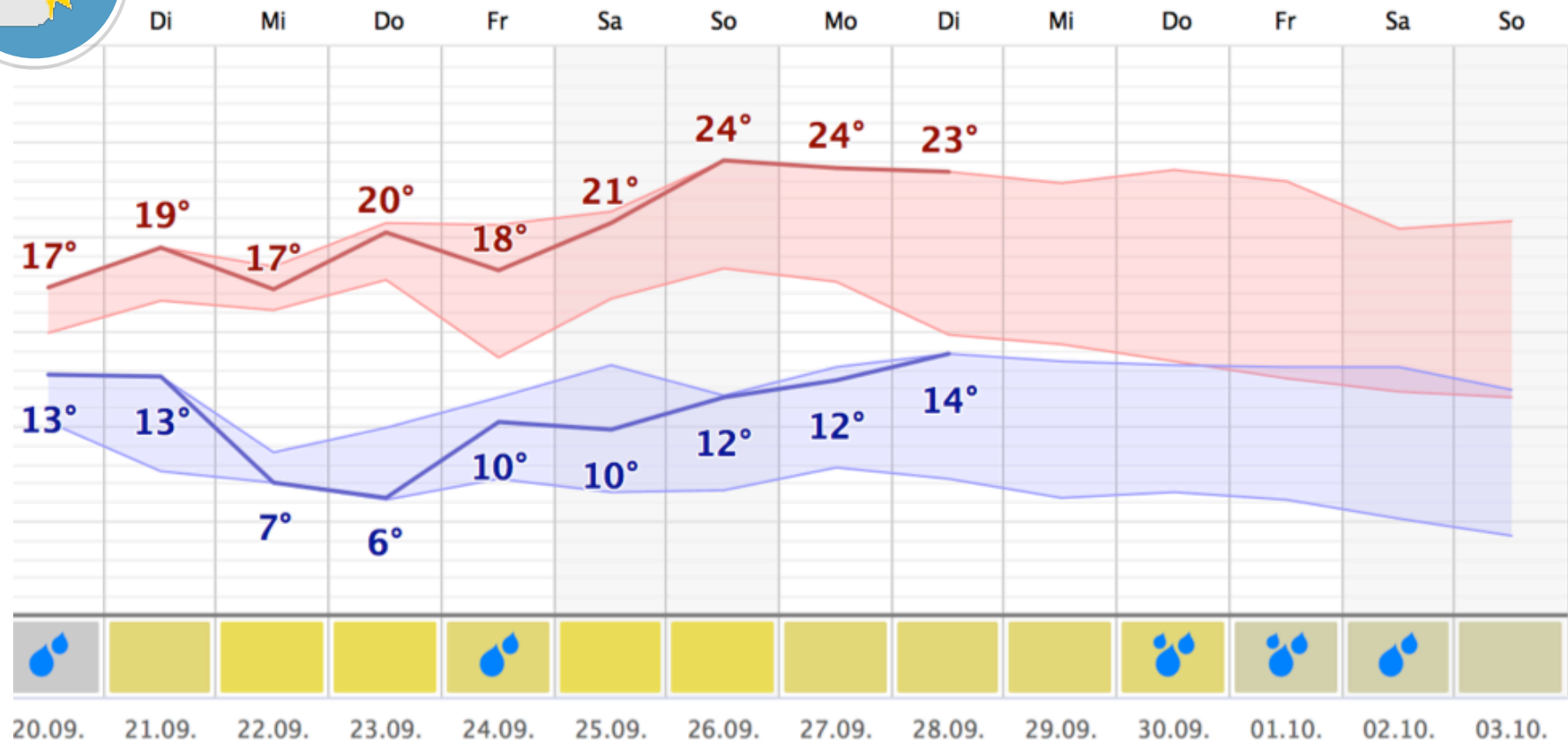
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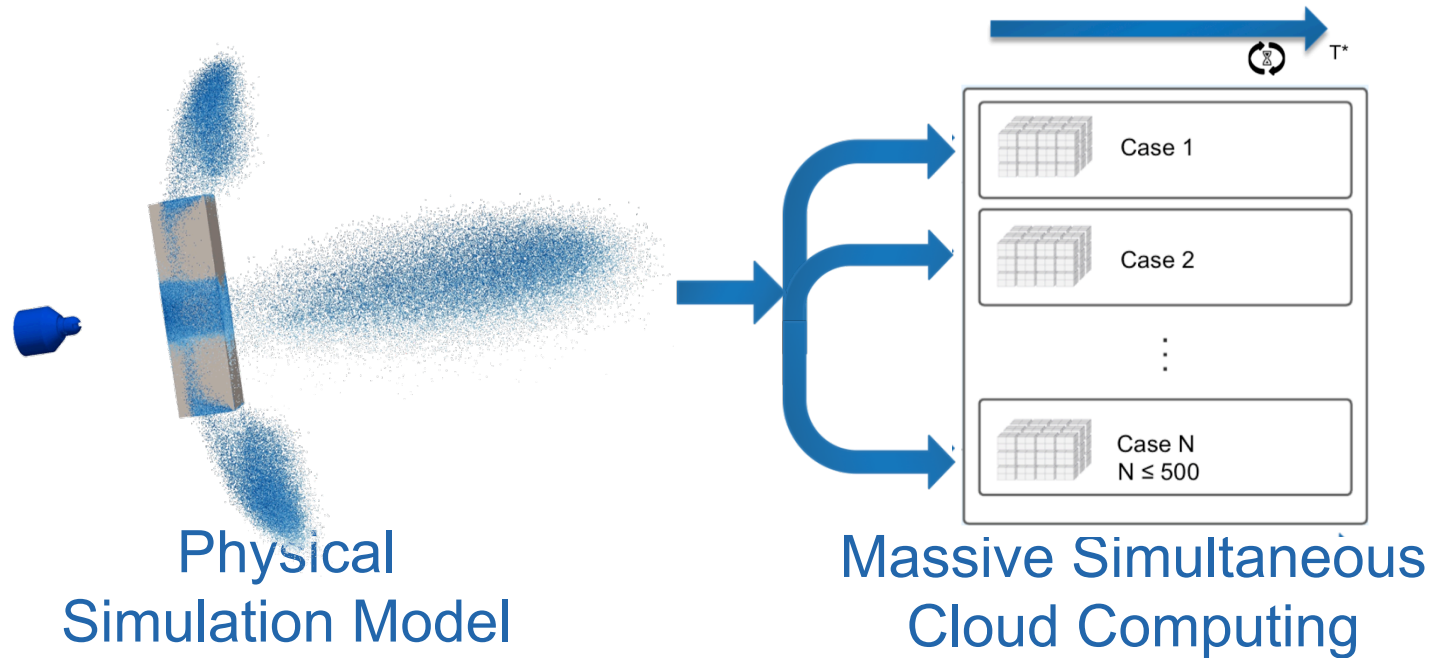
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4th Step: Appreciate Diversity



... far beyond what meets the eye



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