Combining SPH and MCRT for the study of ionising stellar feedback

Collaborators:

Ian Bonnell
Jim Dale
Bert Vandenbroucke
Guillaume Laibe
Diederik Kruijssen

Maya Petkova
Heidelberg University

Types of radiation-hydrodynamics:

Difusion
e.g. Lucy 1977, Brookshaw 1994

Flux-limited difusion (FLD)
e.g. Levermore & Pomraning 1981, Kolb et al. 2013

FLD + ray tracing
e.g. Kuiper et al. 2010

...

Monte Carlo Radiative Transfer

- **MCRT + grid**
  Harries 2015
- **MCRT + moving mesh**
  Vandenbroucke & Wood 2018
- **MCRT + SPH**

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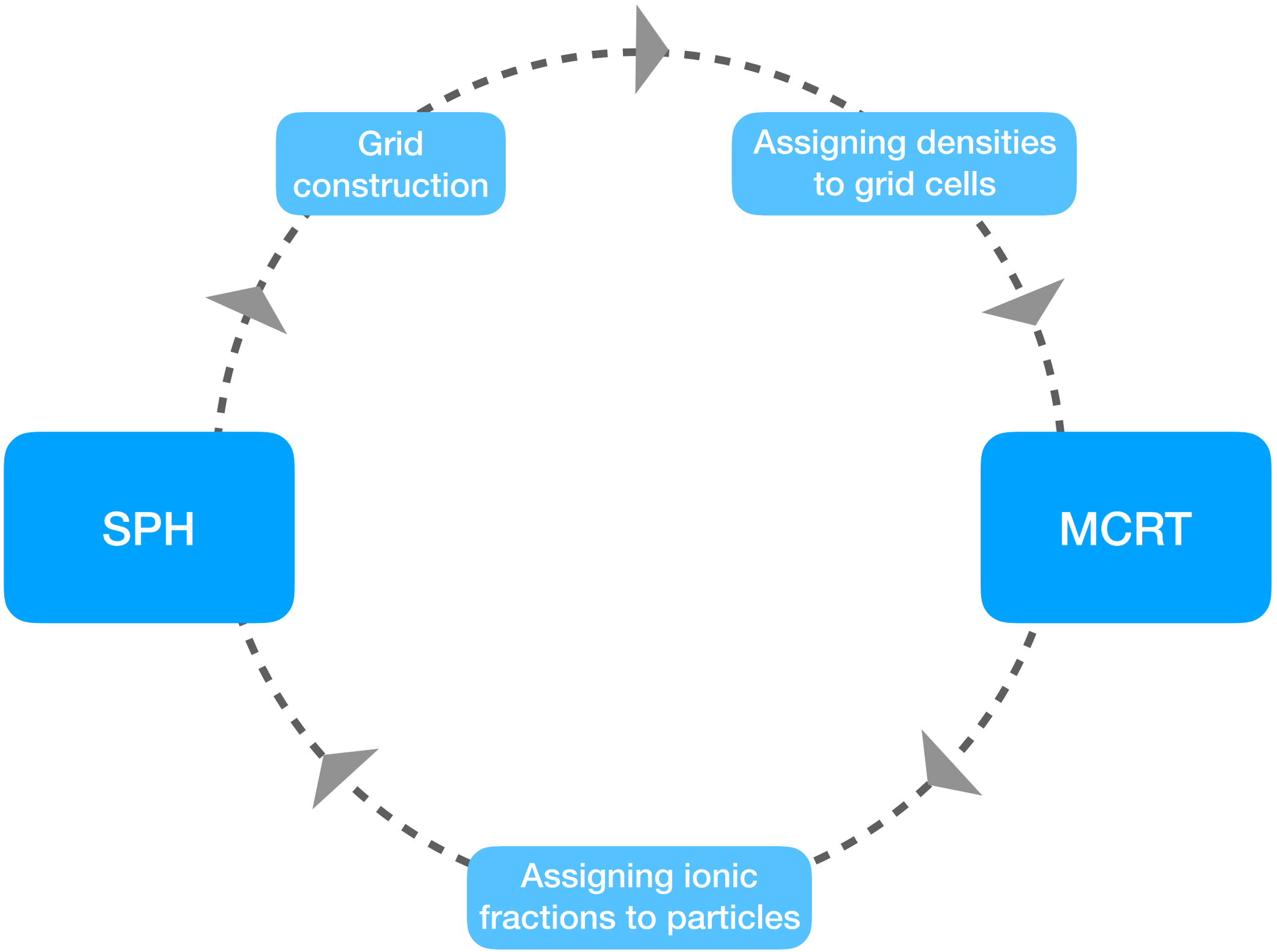
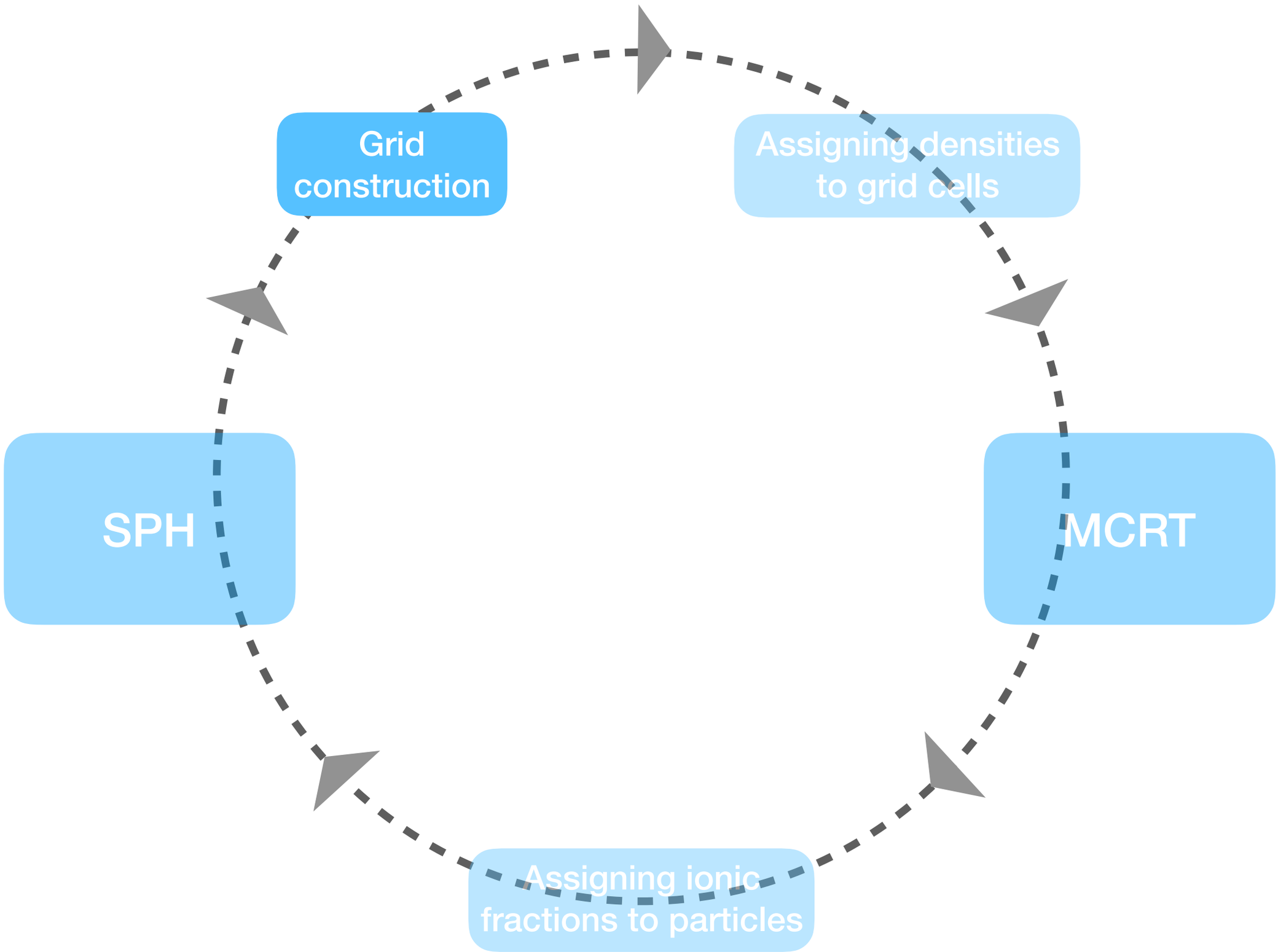

Grid construction
Assigning densities to grid cells
SPH
MCRT
Assigning ionic fractions to particles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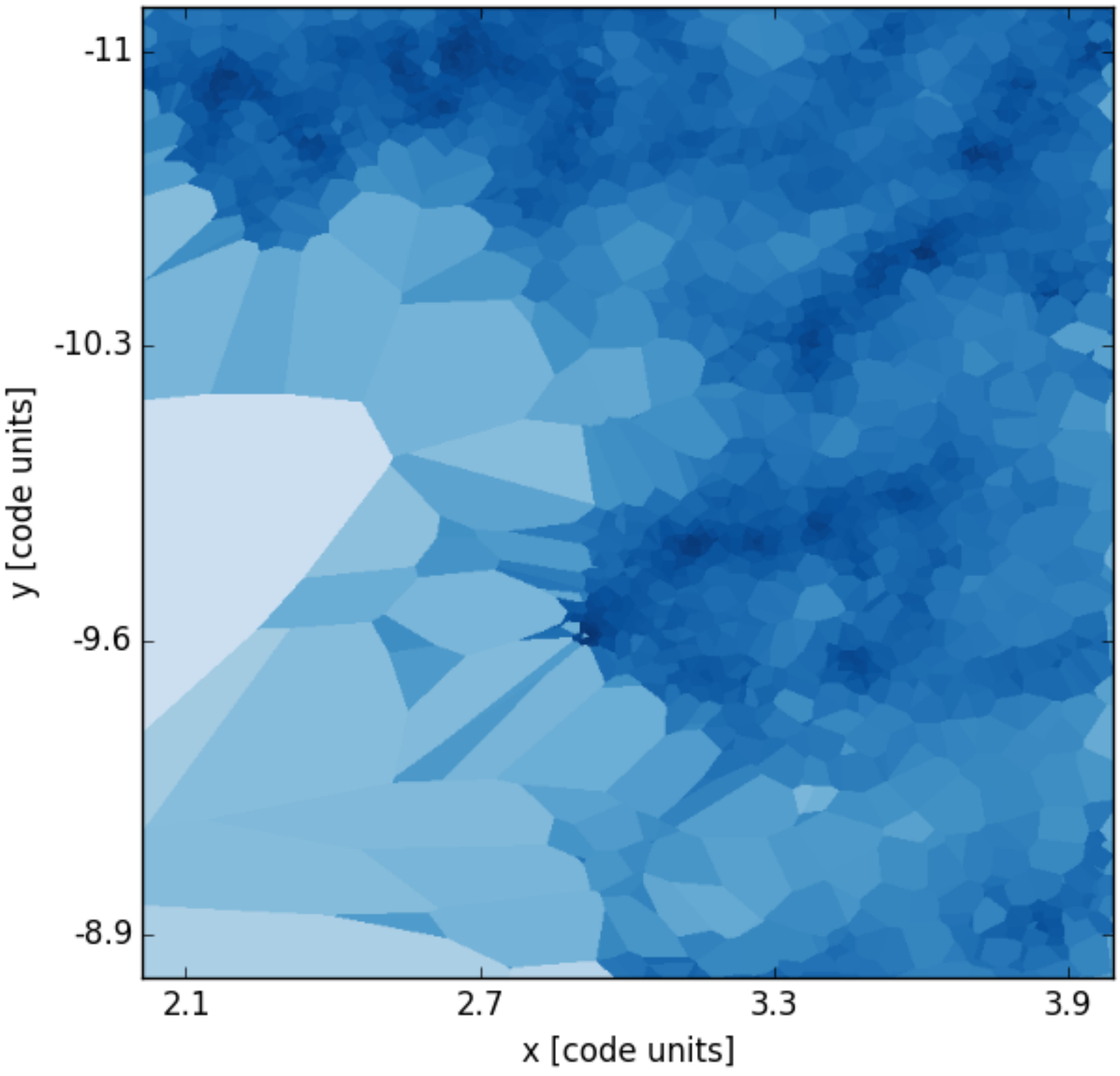
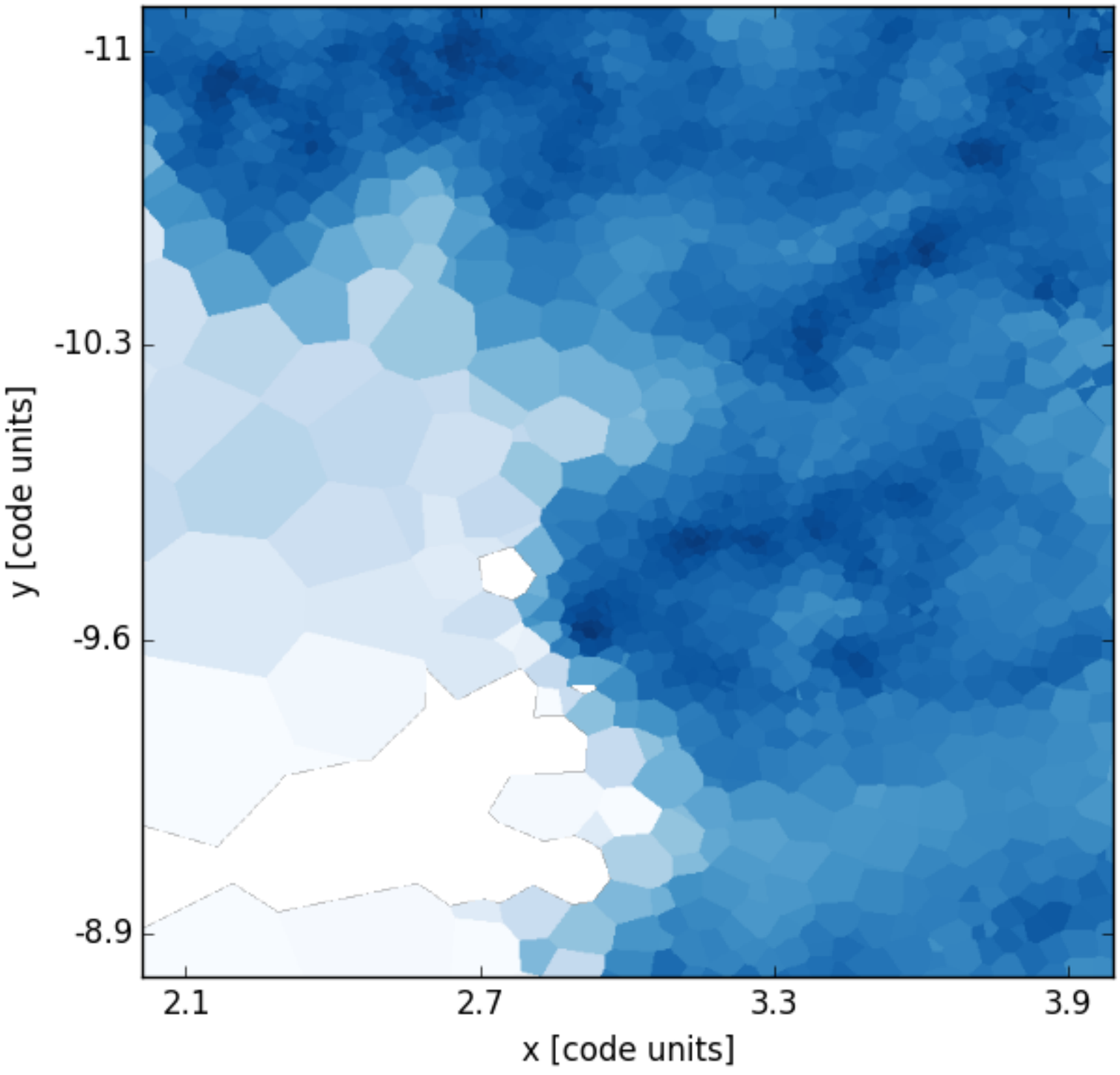
Smooth
Image

Voronoi Grid

Voronoi grid construction

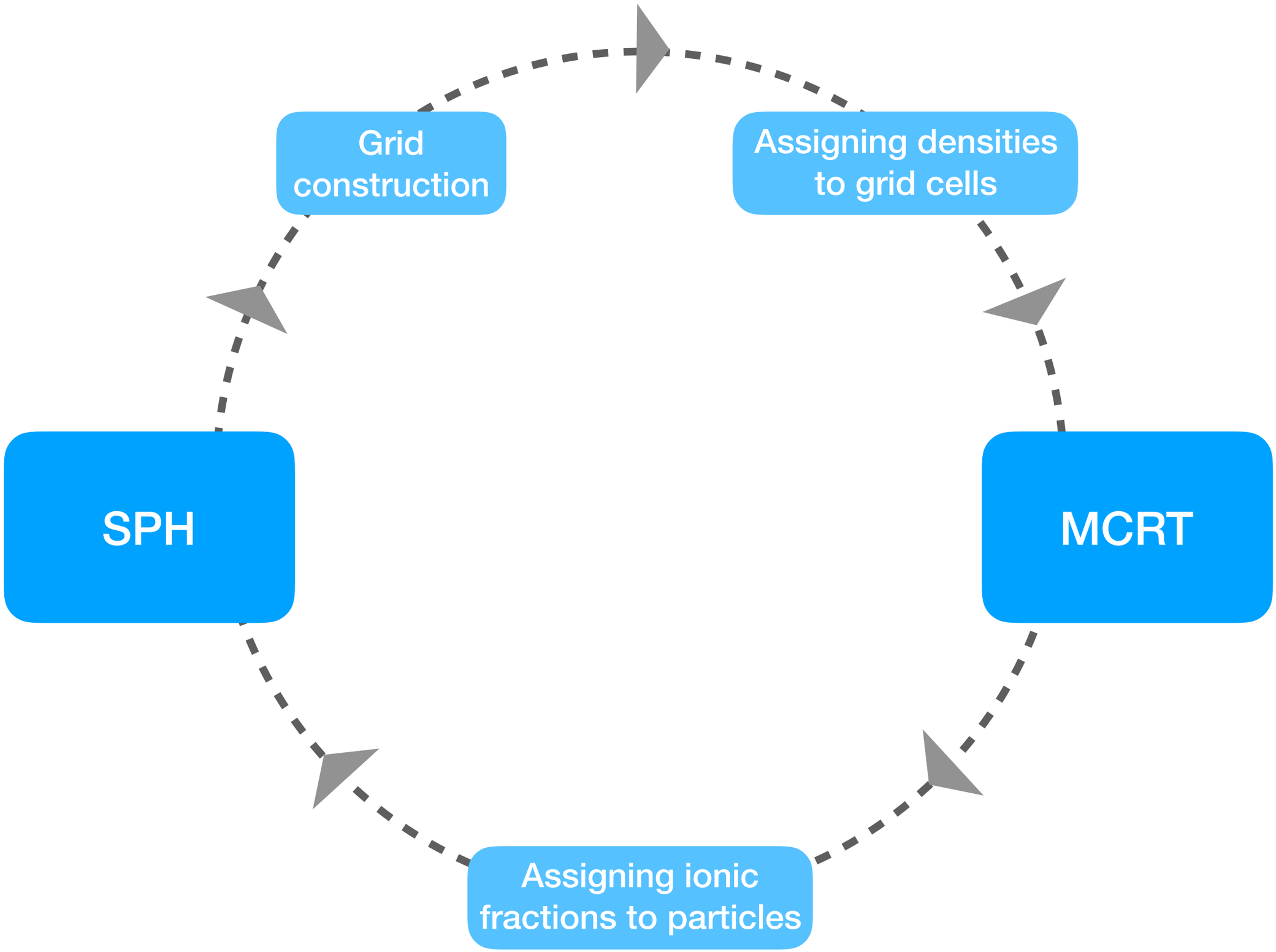


Voronoi grid construction



After 5 Lloyd's iterations

Lloyd 1982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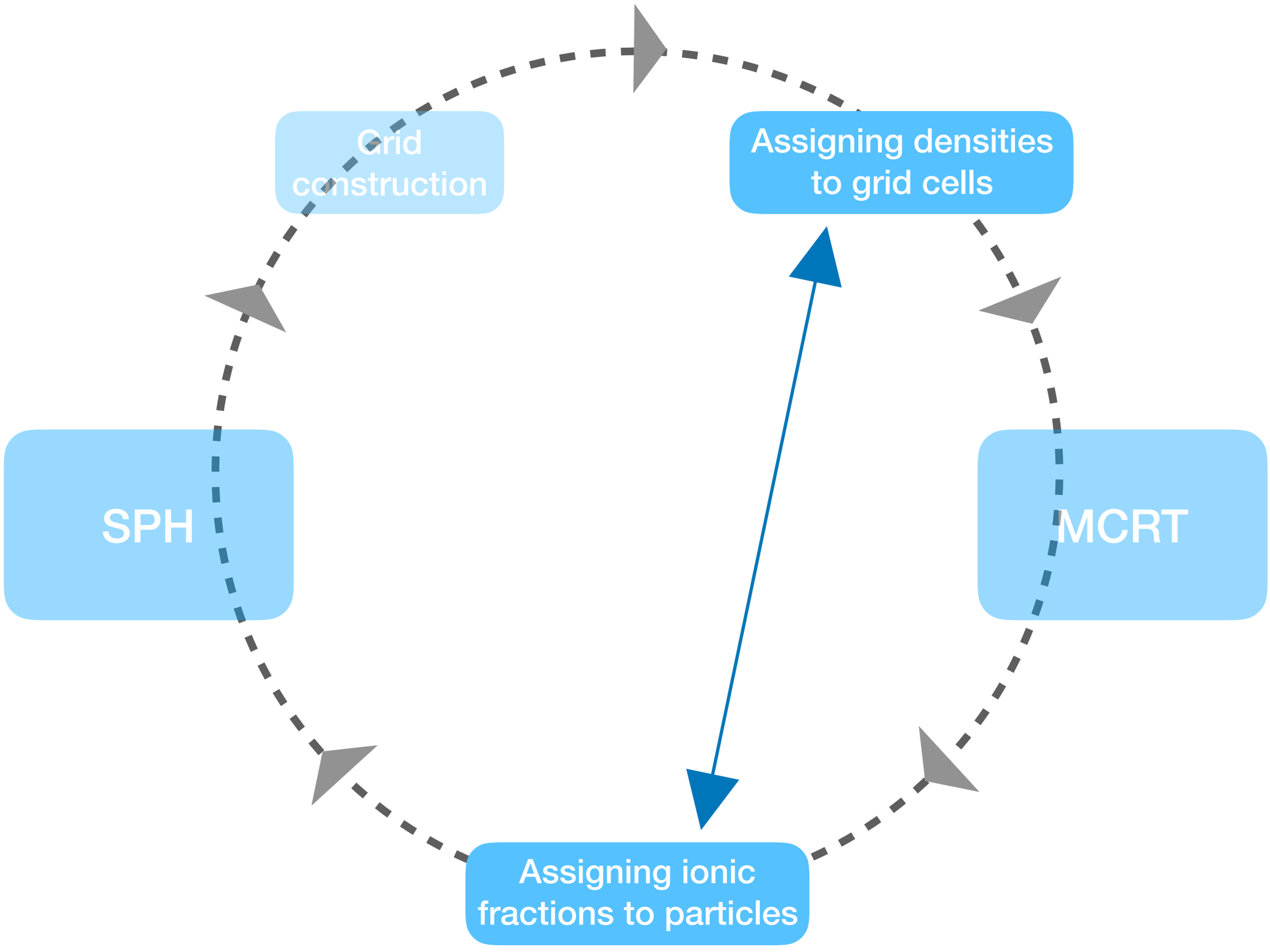
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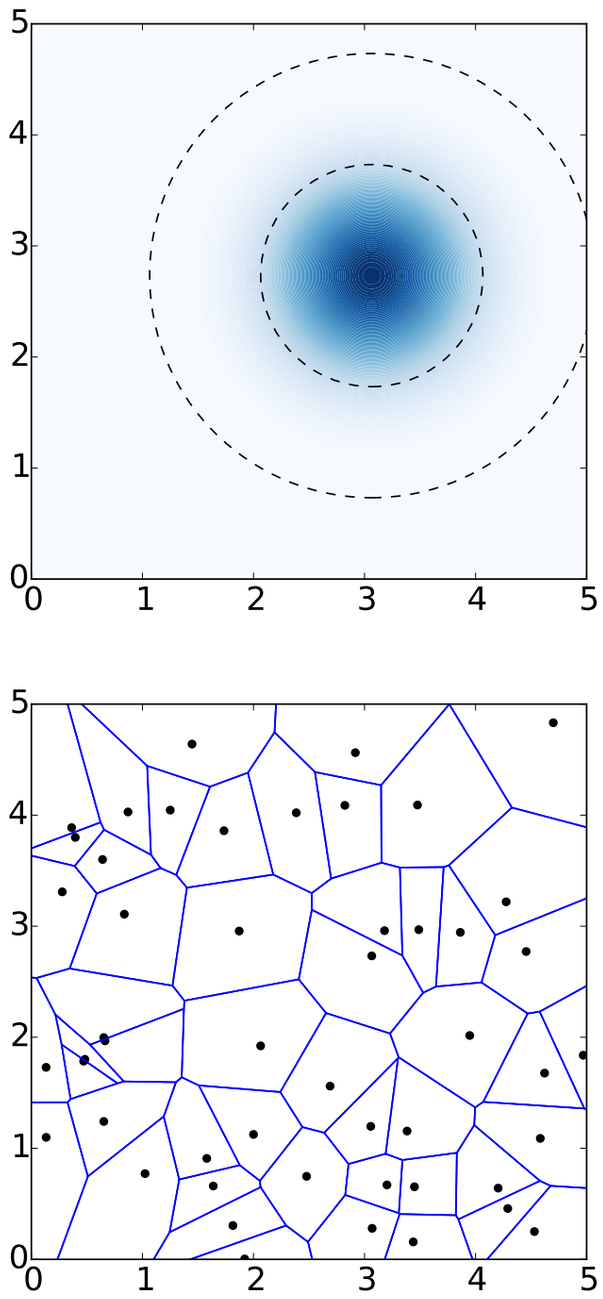
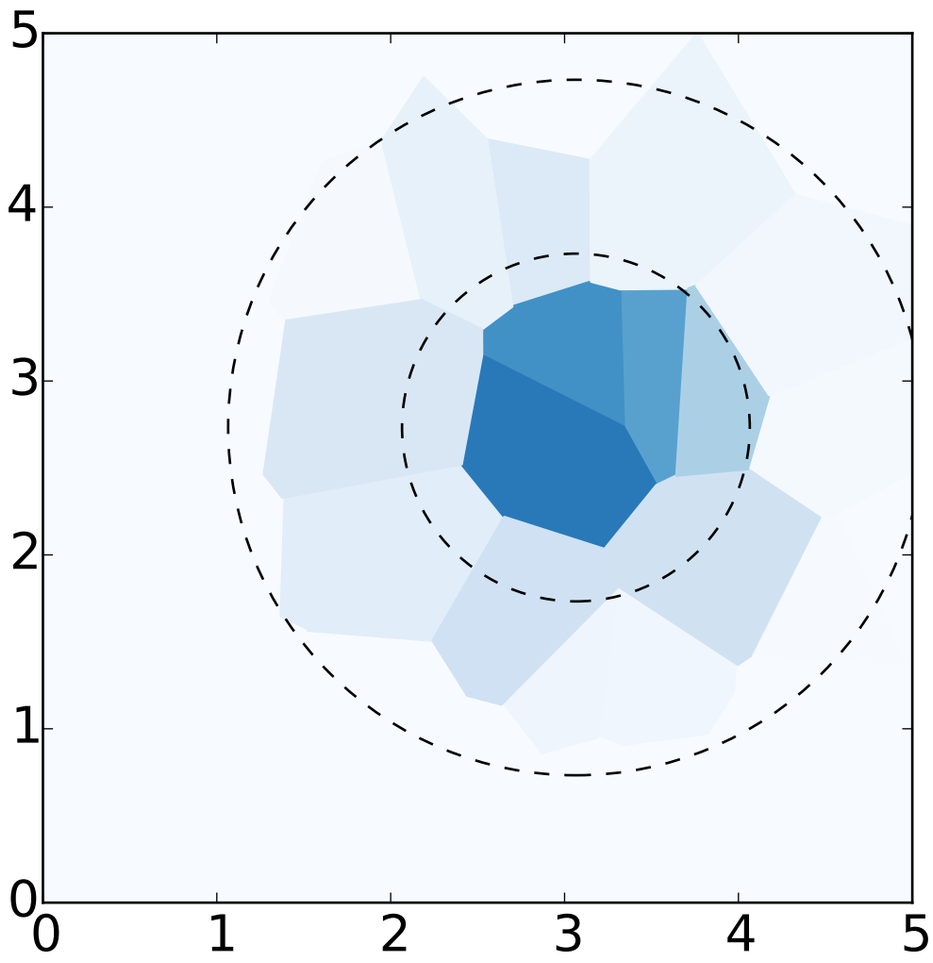
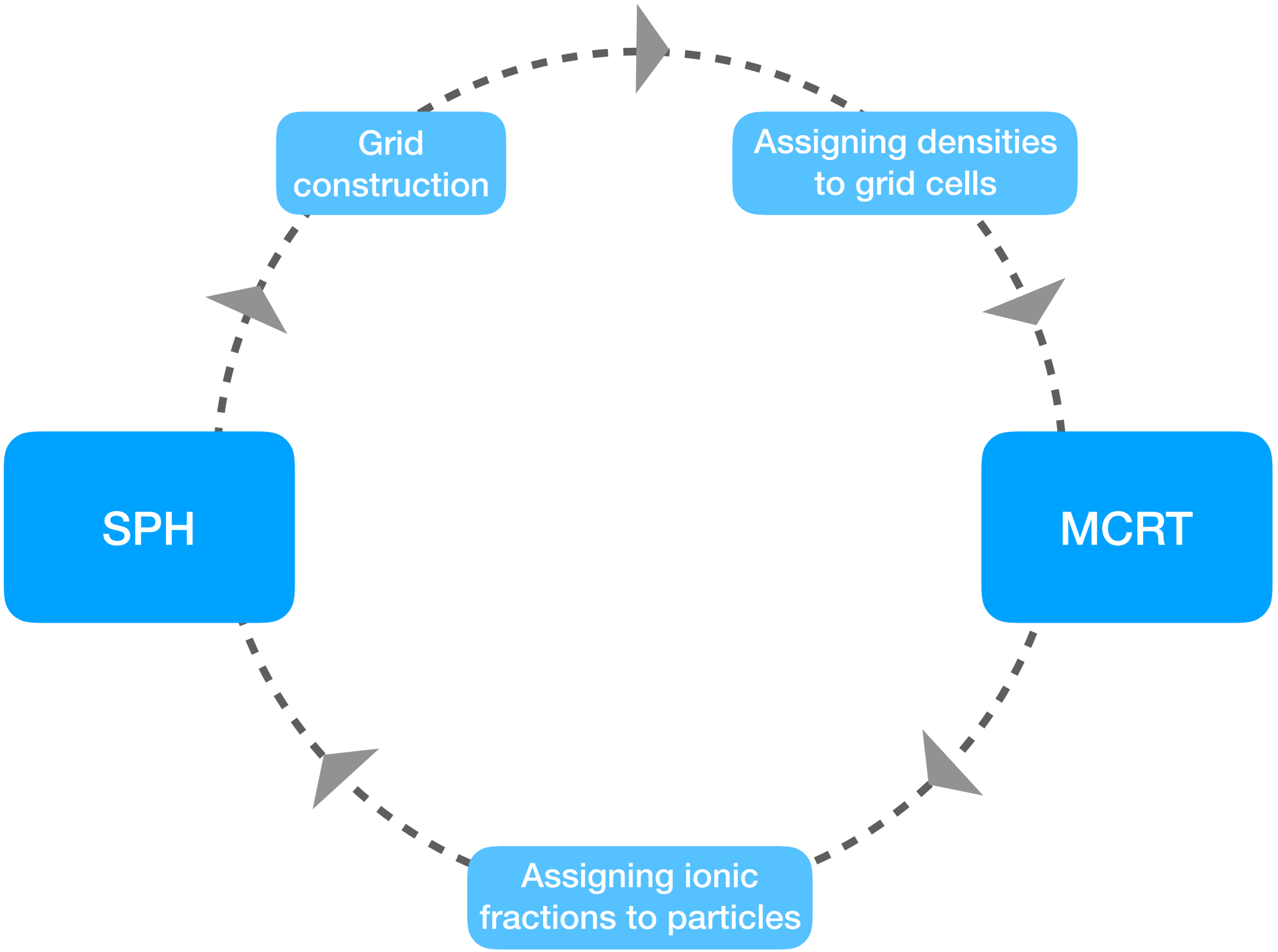
Density mapping on the grid





Petkova at al. 2018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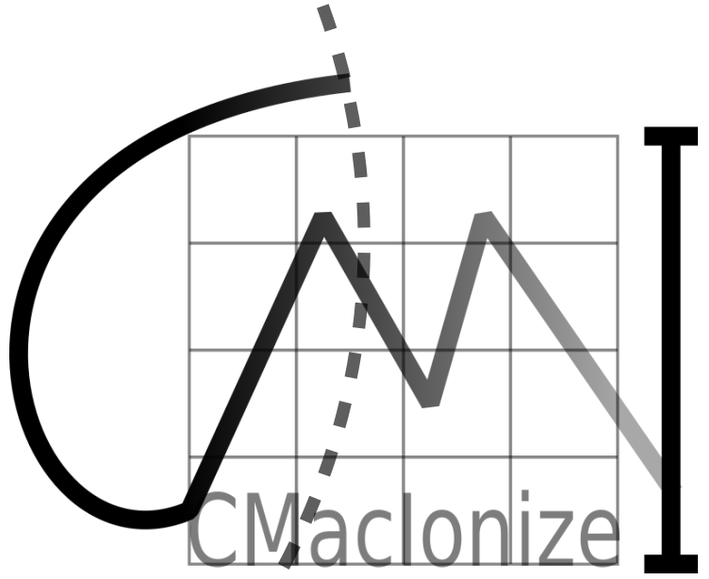
Grid construction

Assigning densities to grid cells

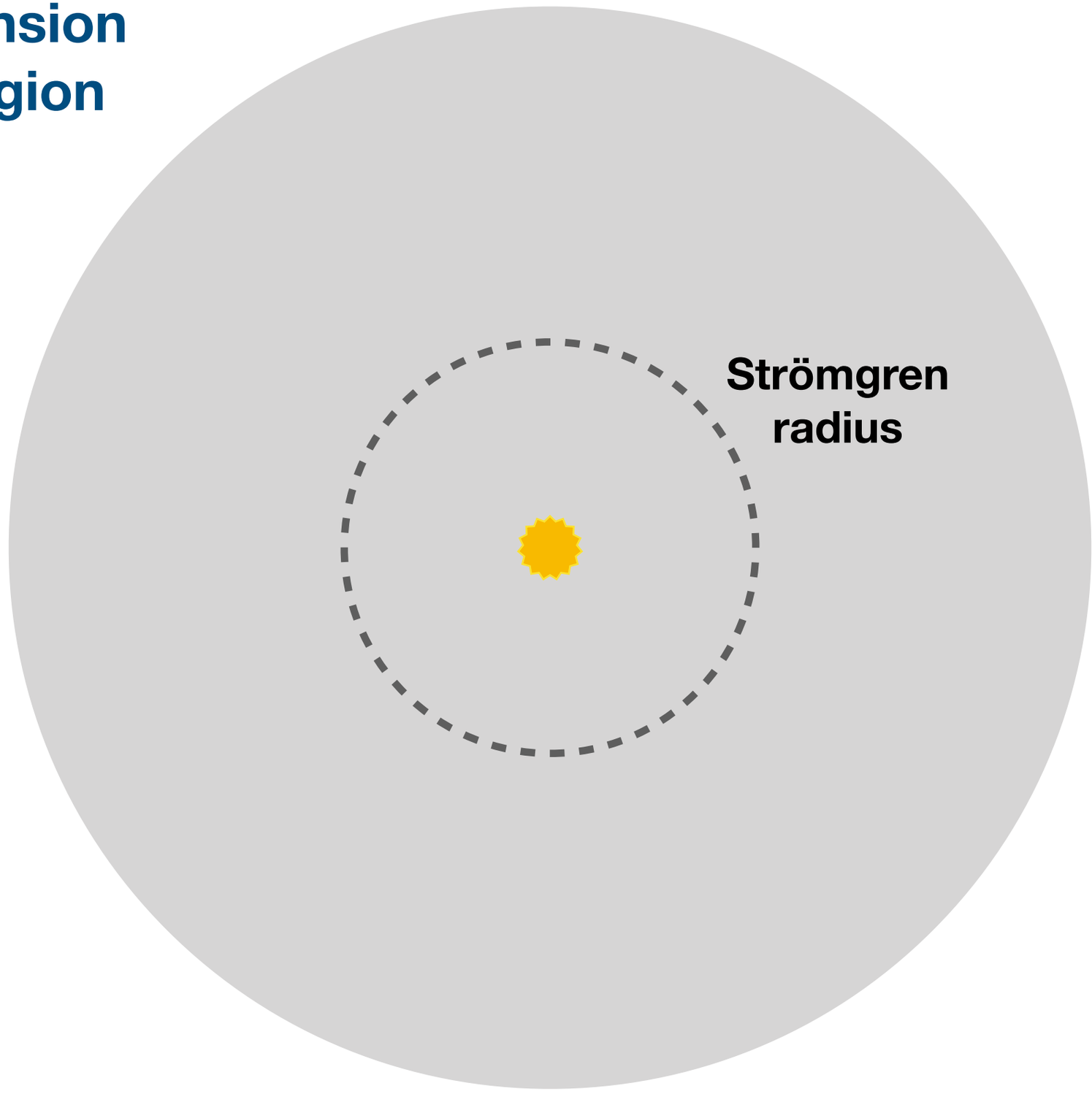
Price at al. 2018



Vandenbroucke & Wood 2018

Assigning ionic fractions to particles

D-type expansion of an H II region



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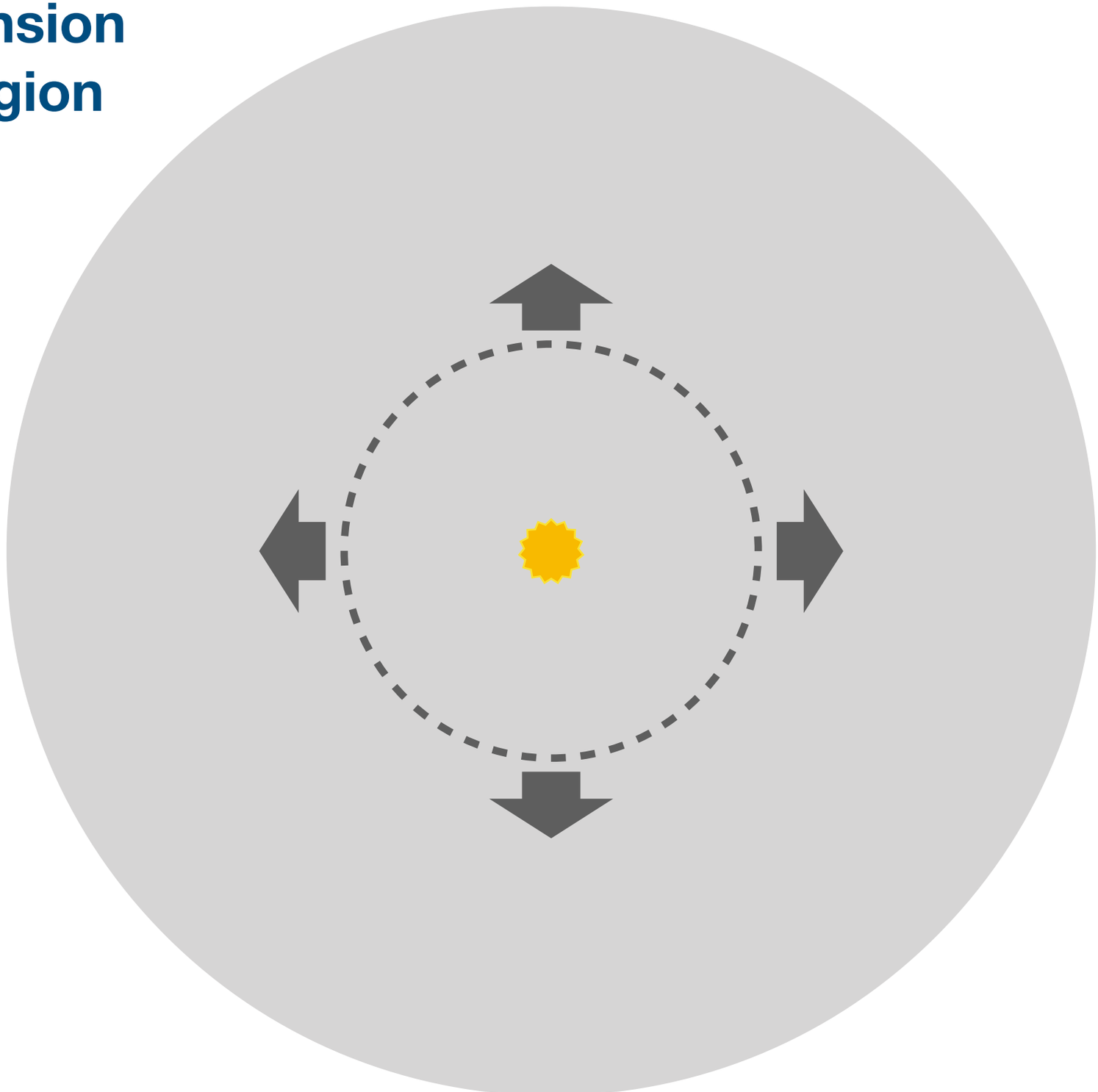

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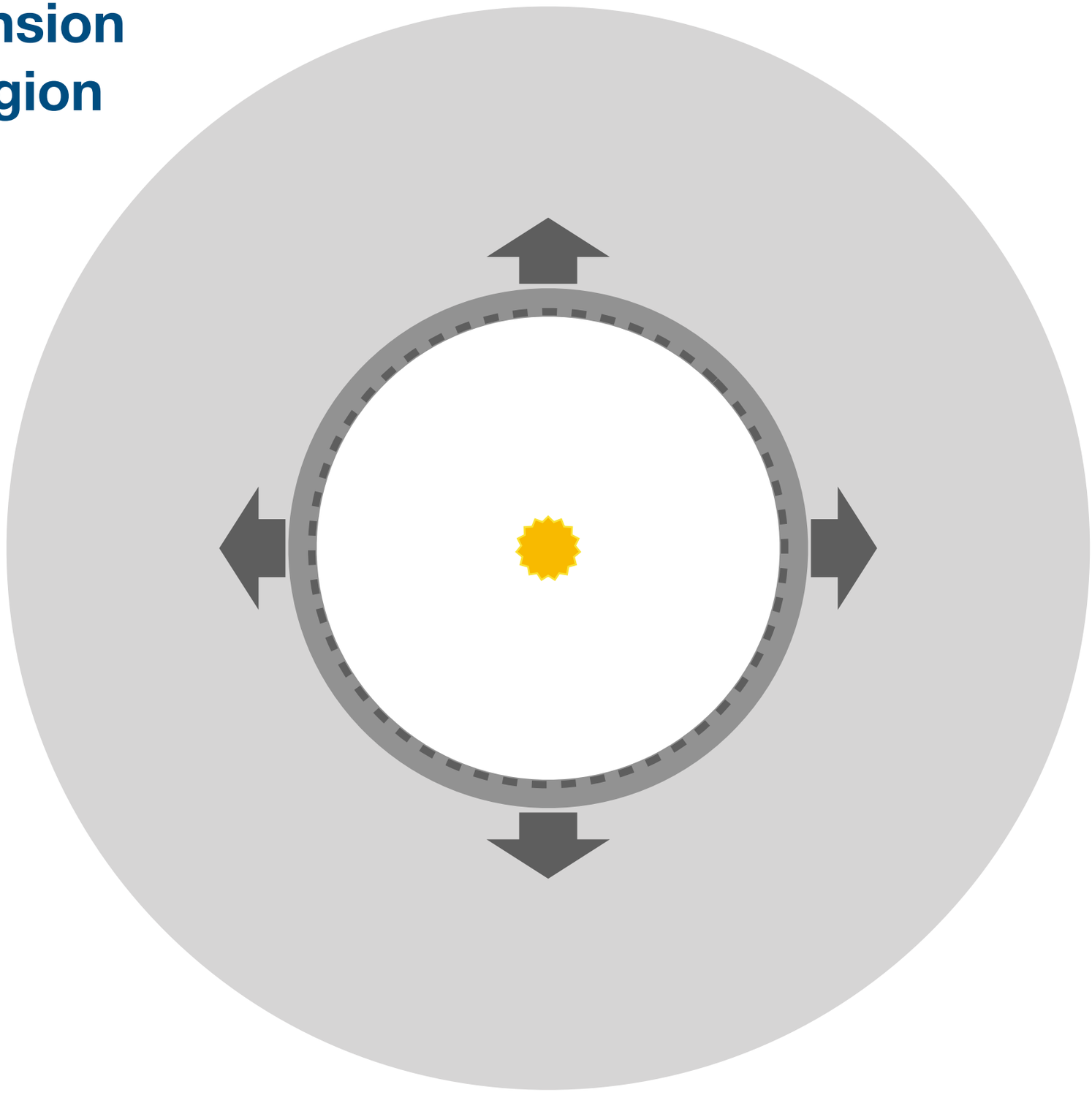

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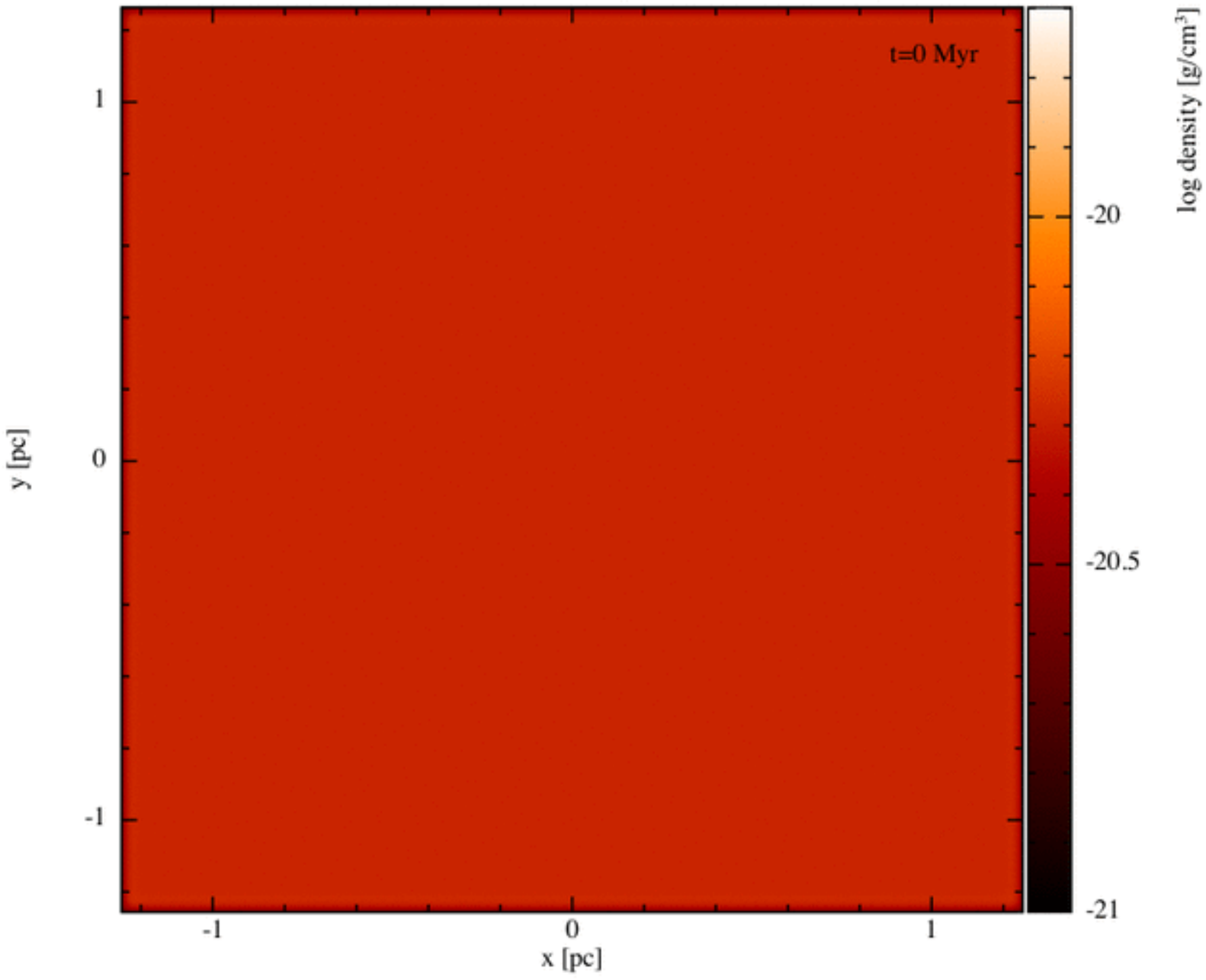

Petkova at al. (in prep)

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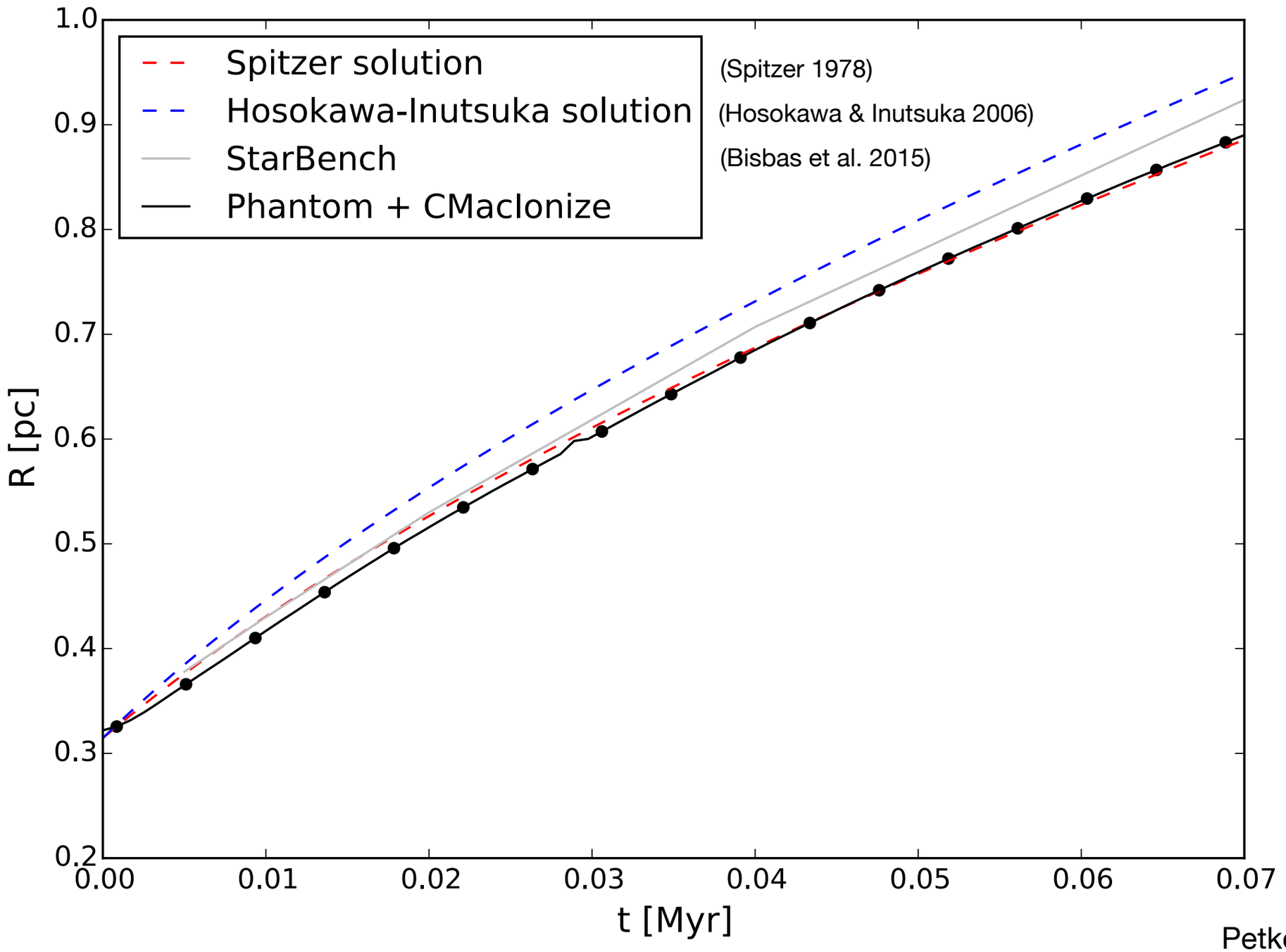

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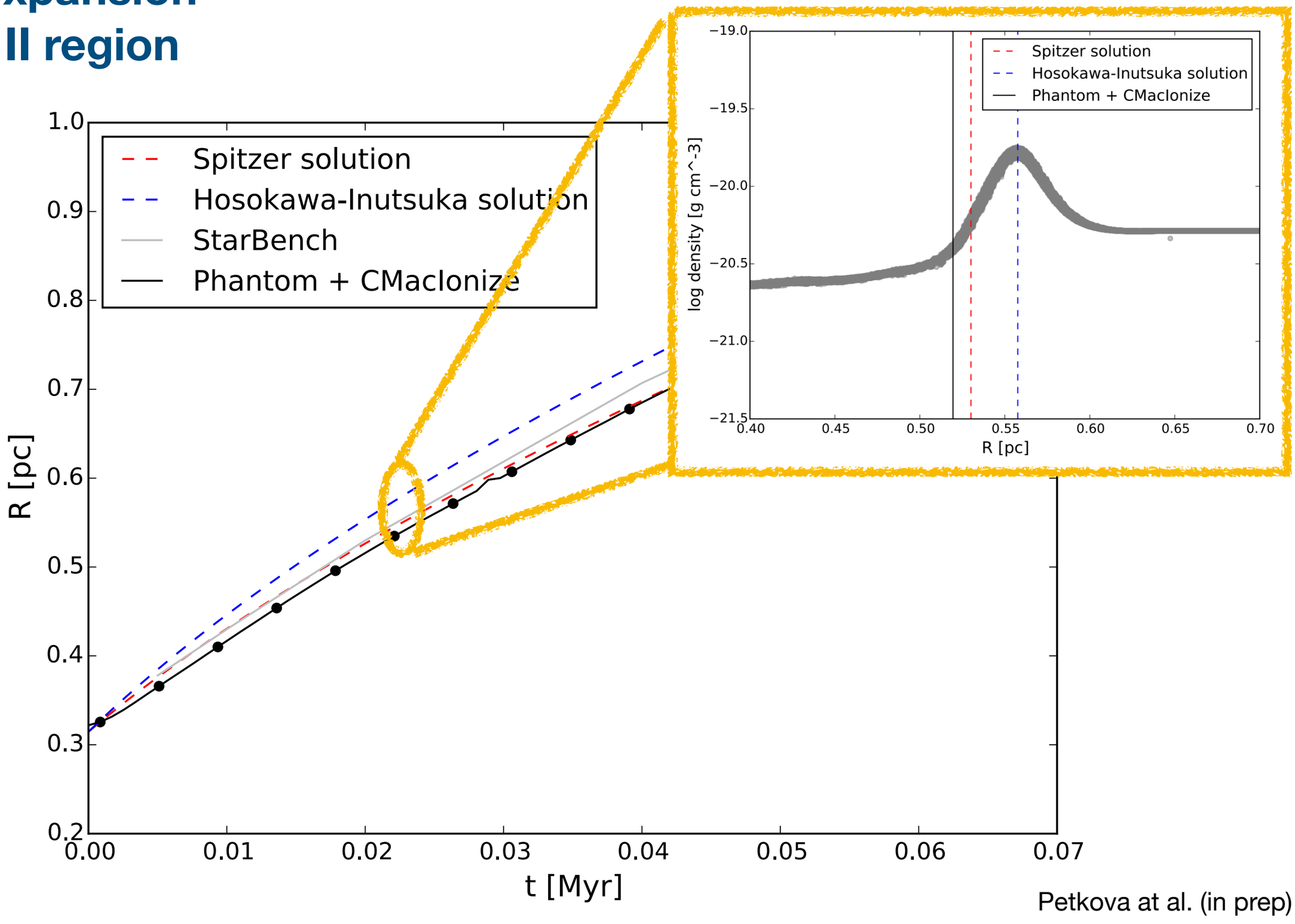

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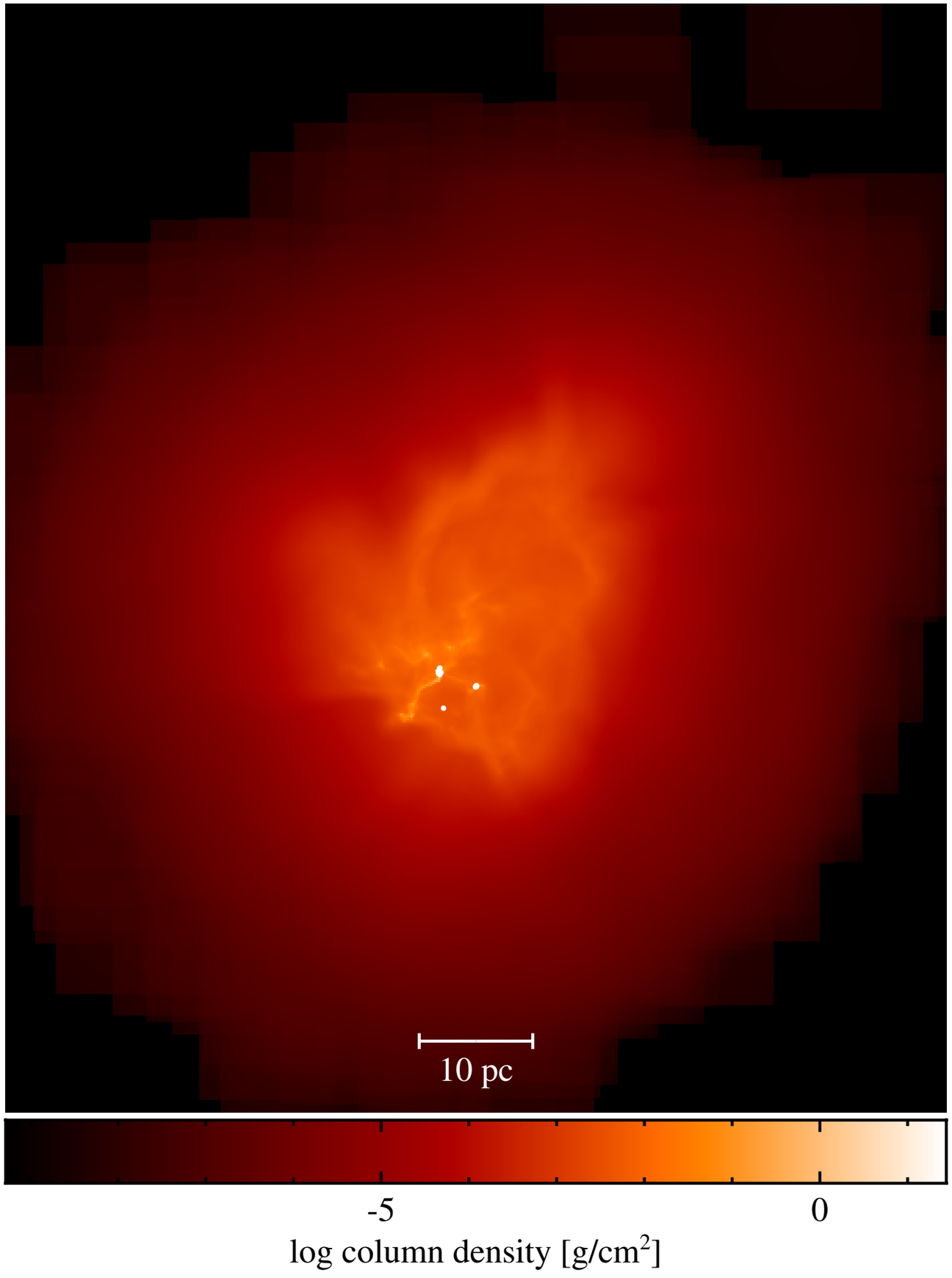
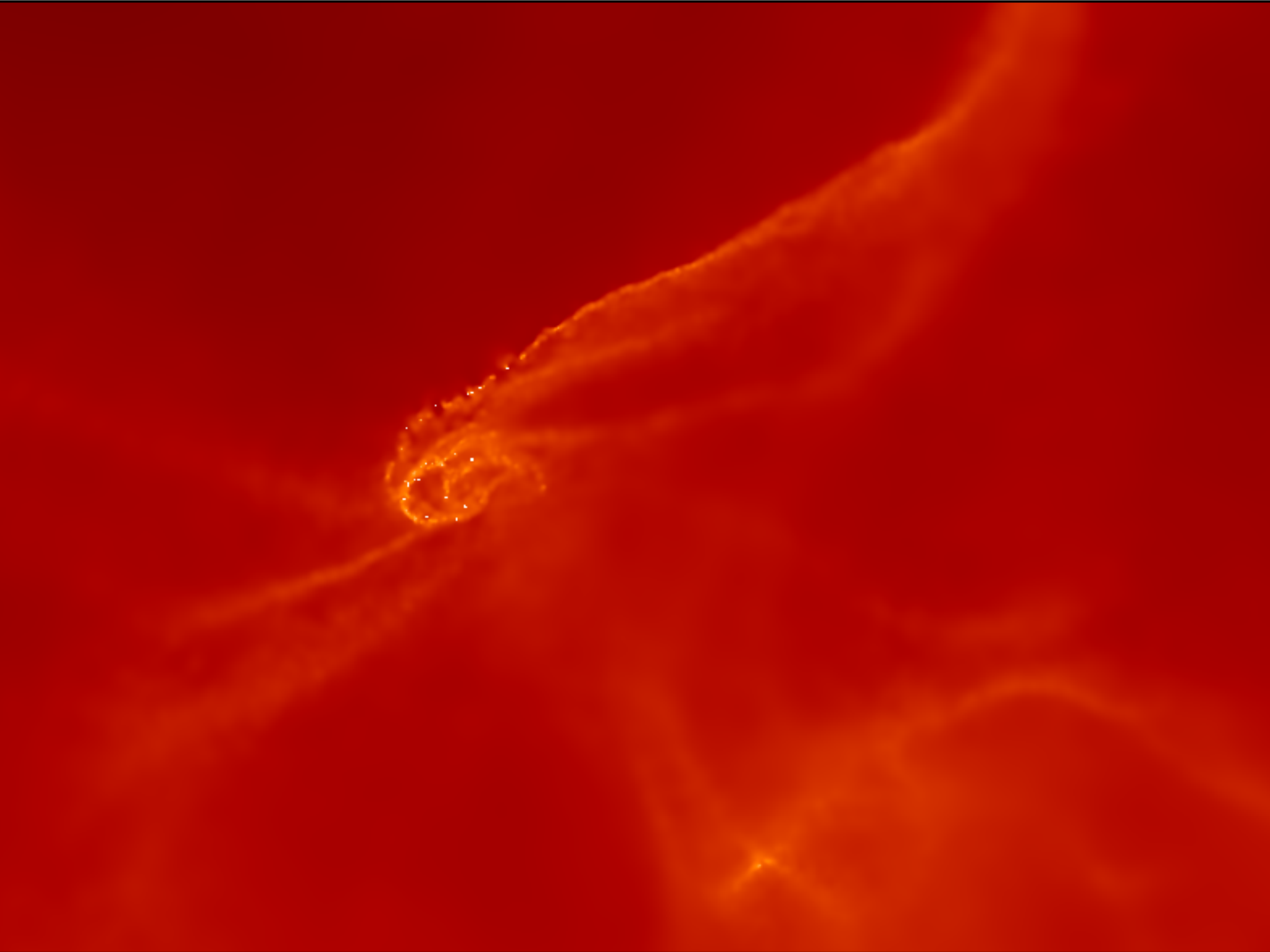
Star Formation Simulation



- **Total mass of 10^4 $M_\odot$**
- **10^6 SPH particles**
- **Ionisation from stars with M > 20 $M_\odot$**

Dale at al. 2012



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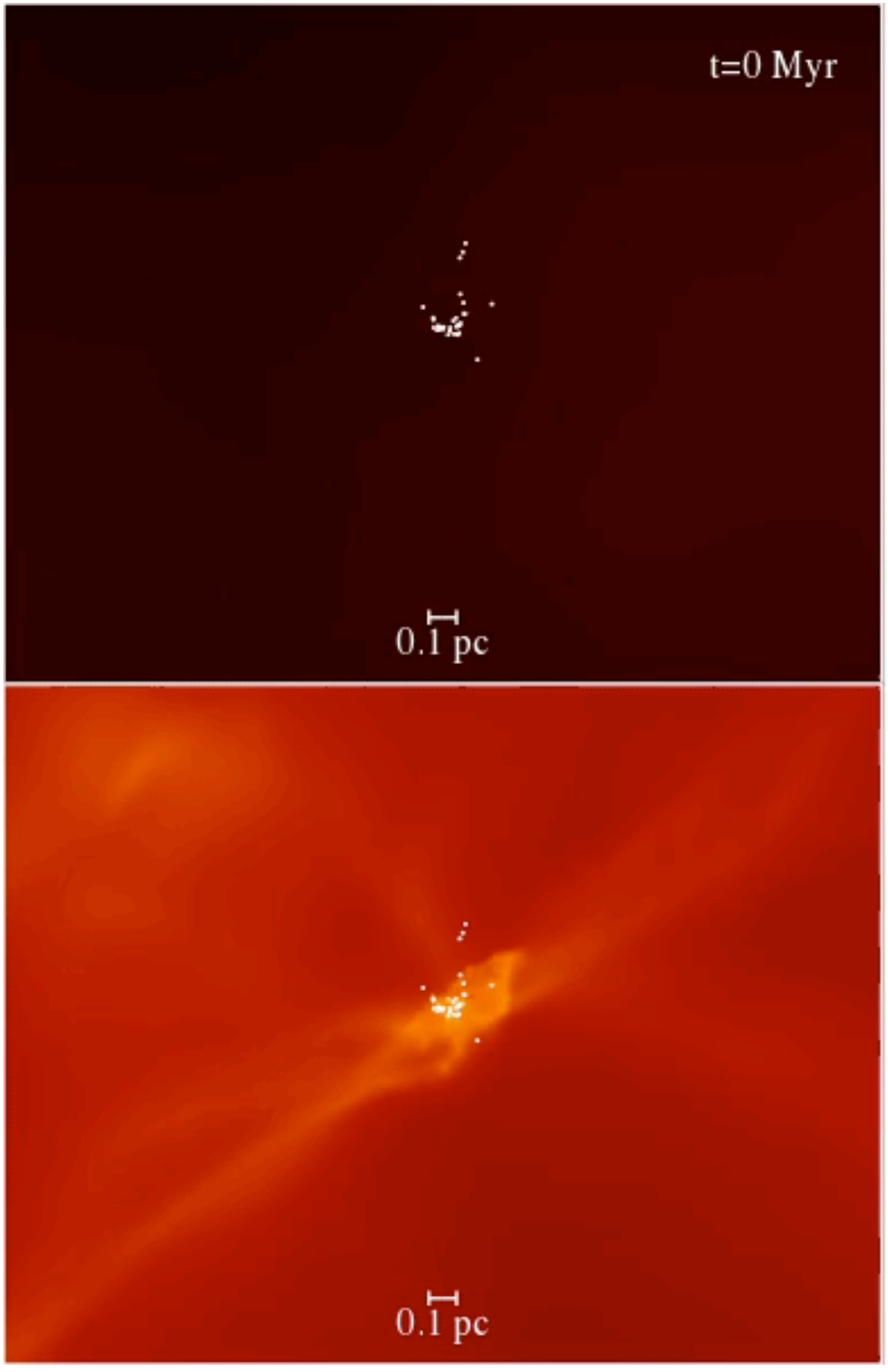
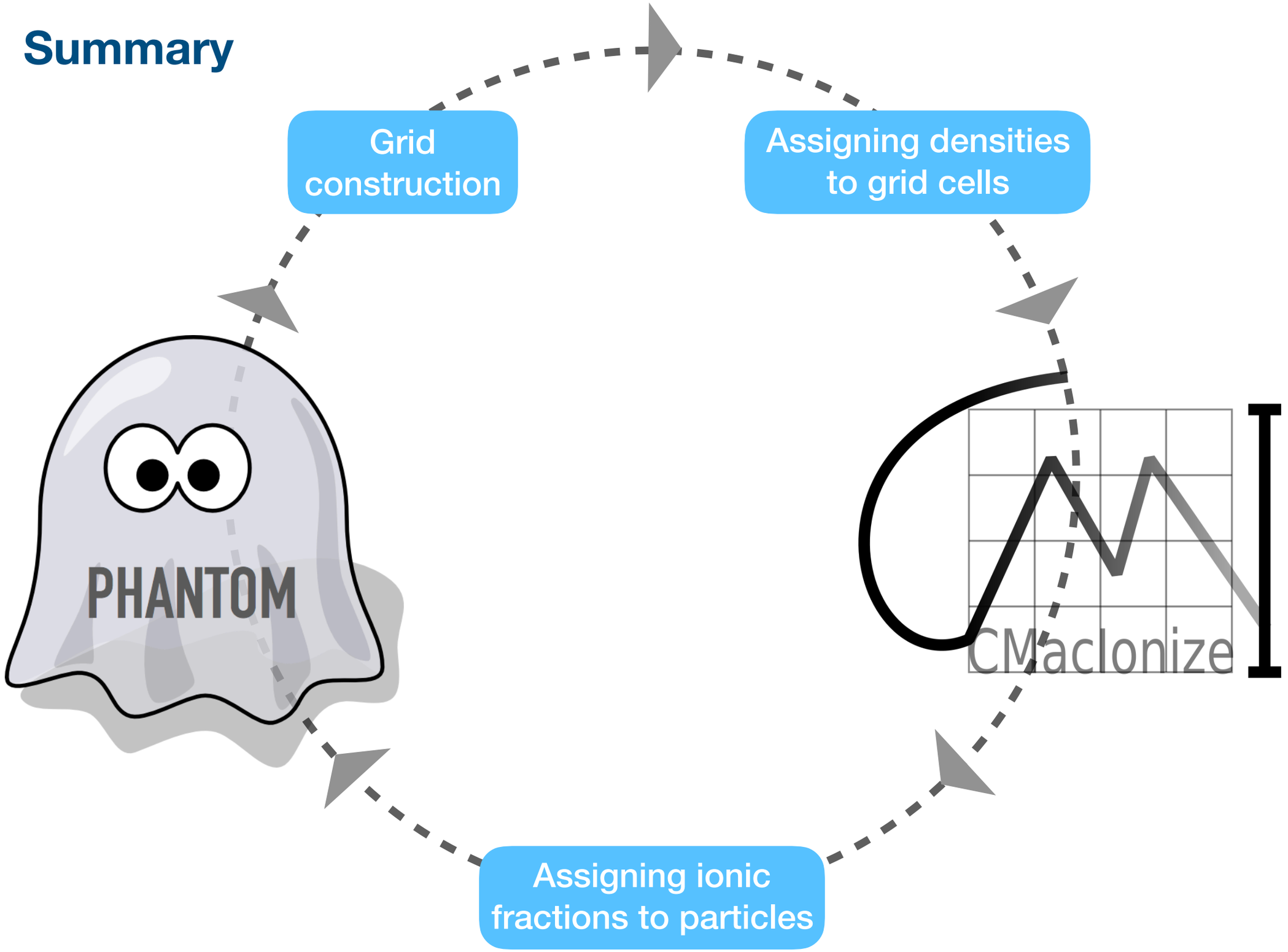


Summary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