A particle-in-cell method for the study of double-diffusive convection in the internal liquid layers of planets.

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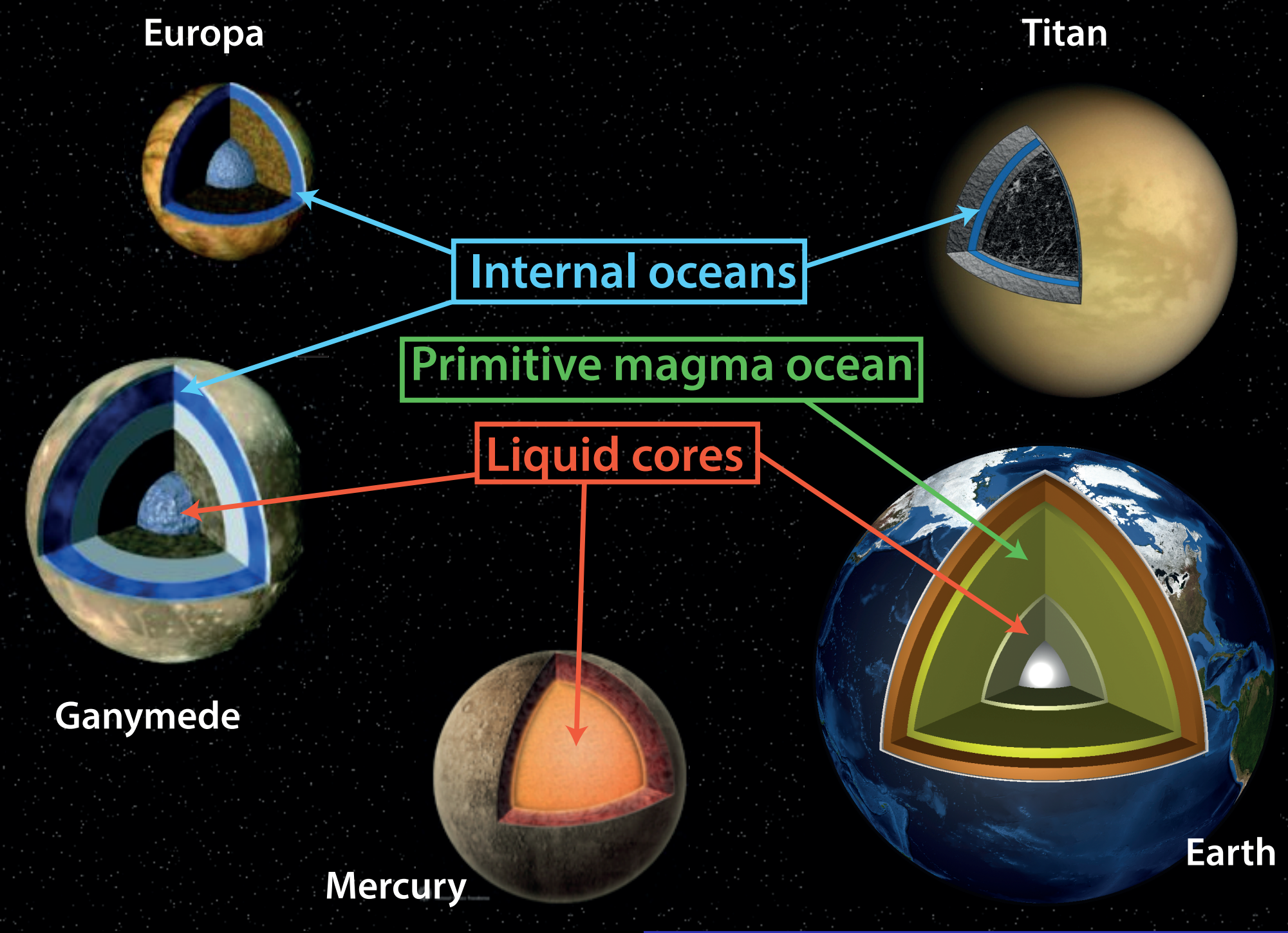
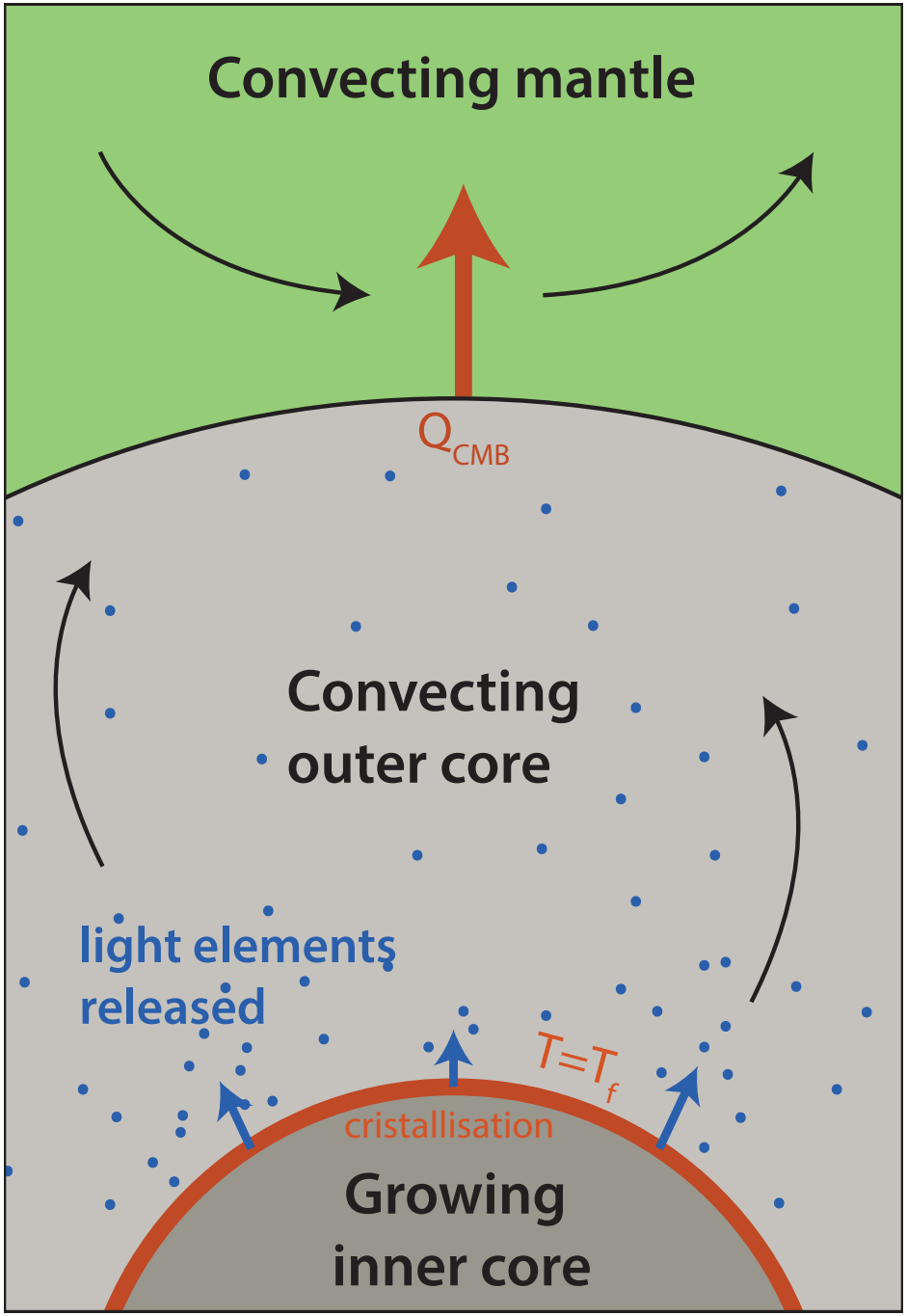

Europa
Titan
Internal oceans
Primitive magma ocean
Liquid cores
Ganymede
Mercury
Earth



2 buoyancy sources :

- Temperature
- Composition

Temperature and Composition have very different molecular diffusivities:

$$Le = \frac{\kappa^T}{\kappa^\xi} \sim 1000$$

Salt fingering convection

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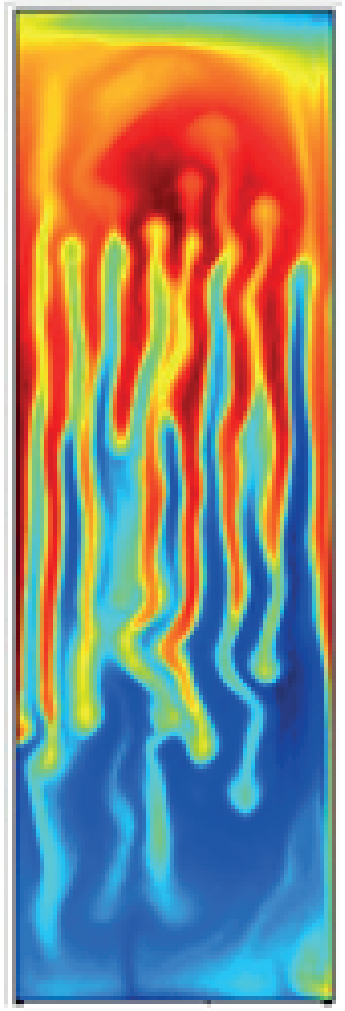
$$Le = \frac{\kappa^T}{\kappa^\xi} \sim 1000$$

One should solve two distinct transport equations:

$$\frac{\partial T}{\partial t} = -\vec{u} \cdot \vec{\nabla} T + \frac{1}{Pr_T} \vec{\nabla}^2 T$$

$$\frac{\partial C}{\partial t} = -\vec{u} \cdot \vec{\nabla} C \left(+ \frac{1}{Pr_C} \vec{\nabla}^2 C \right)$$



Salt fingering convection