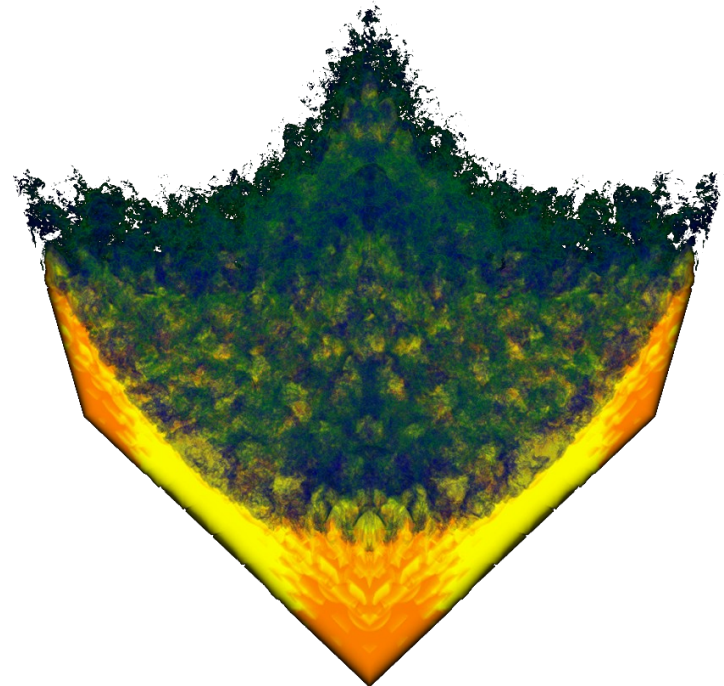
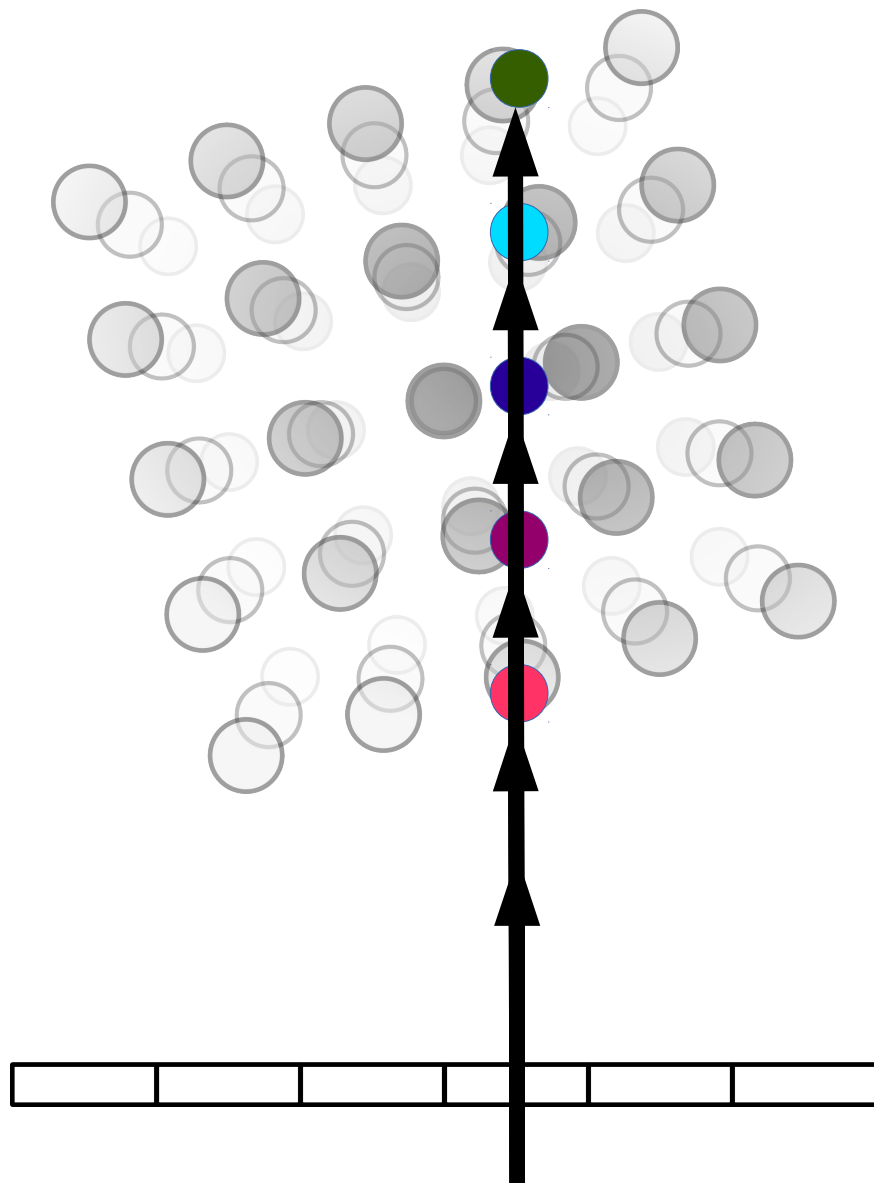


Analysis of Ray-Guided Volume Rendering

Thomas Fogal, Alexander Schiewe, and Jens Krüger

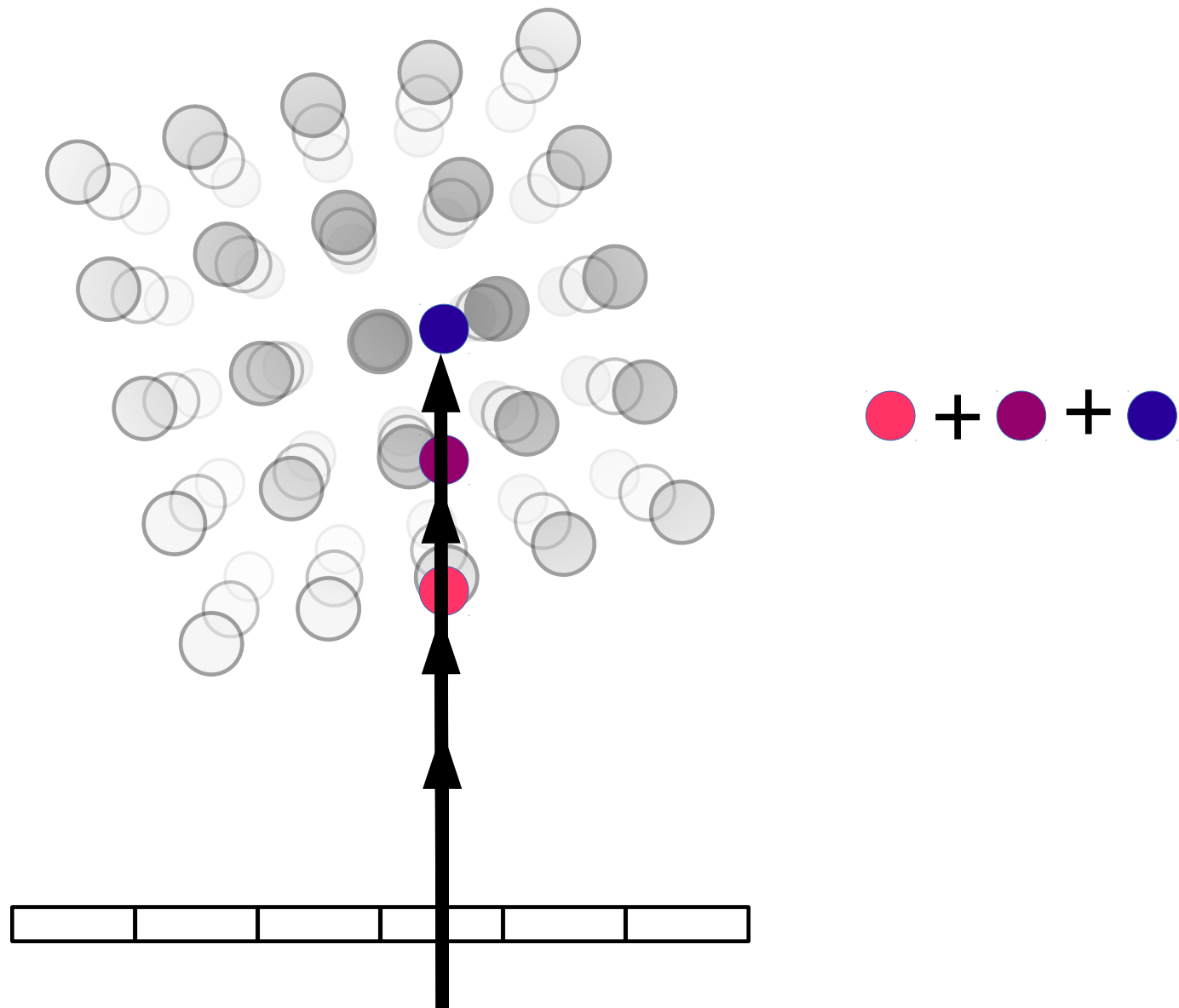


VolRen Background

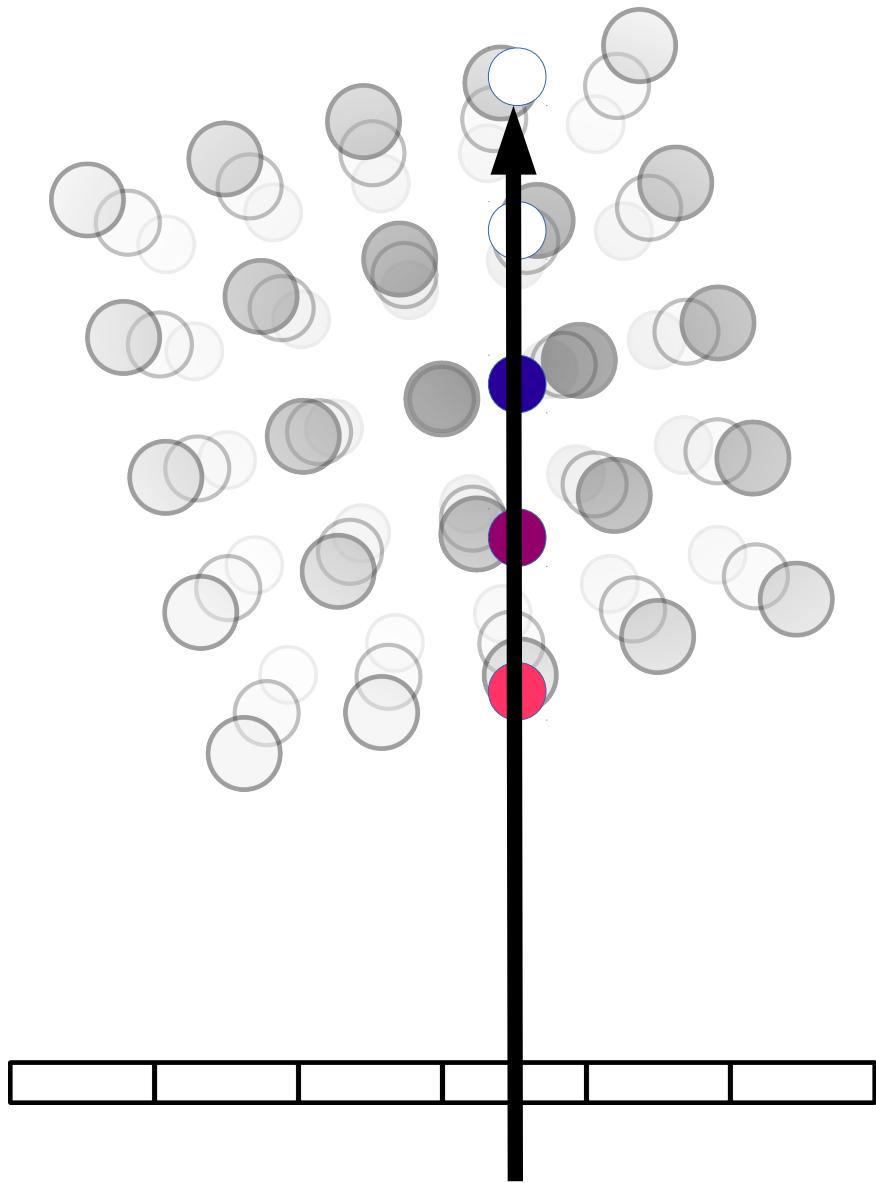


● + ● + ● + ● + ●

VolRen Background

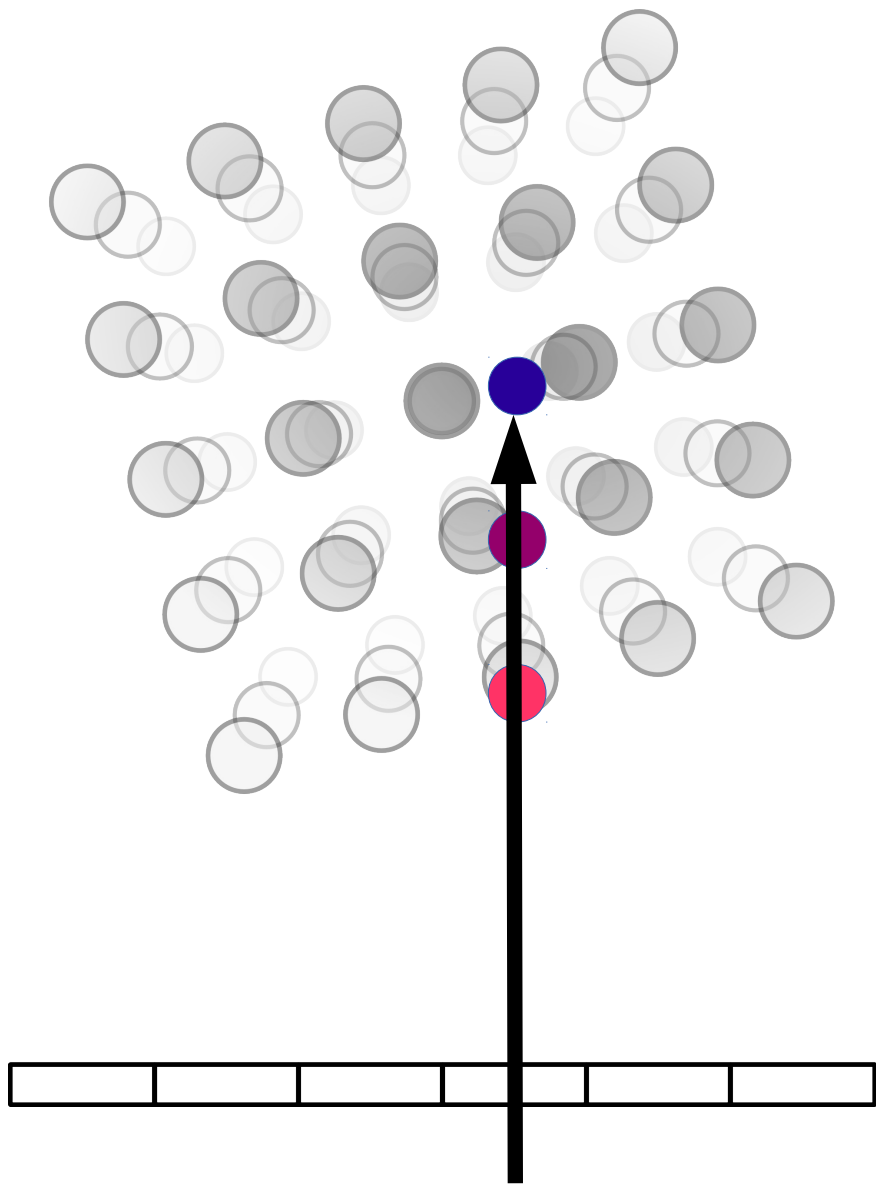


Full Alpha



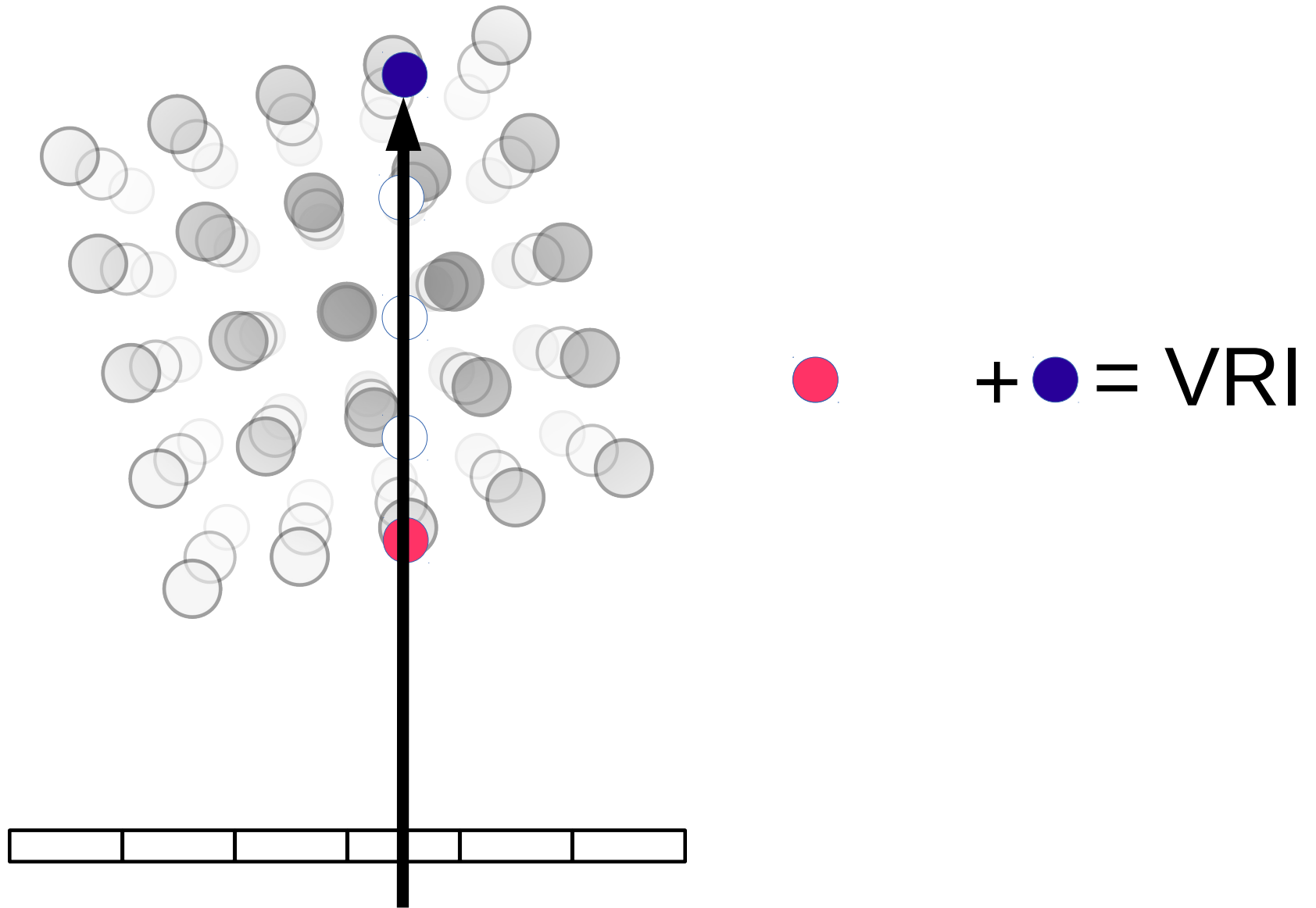
$$\bullet + \bullet + \bullet + \circ + \circ$$

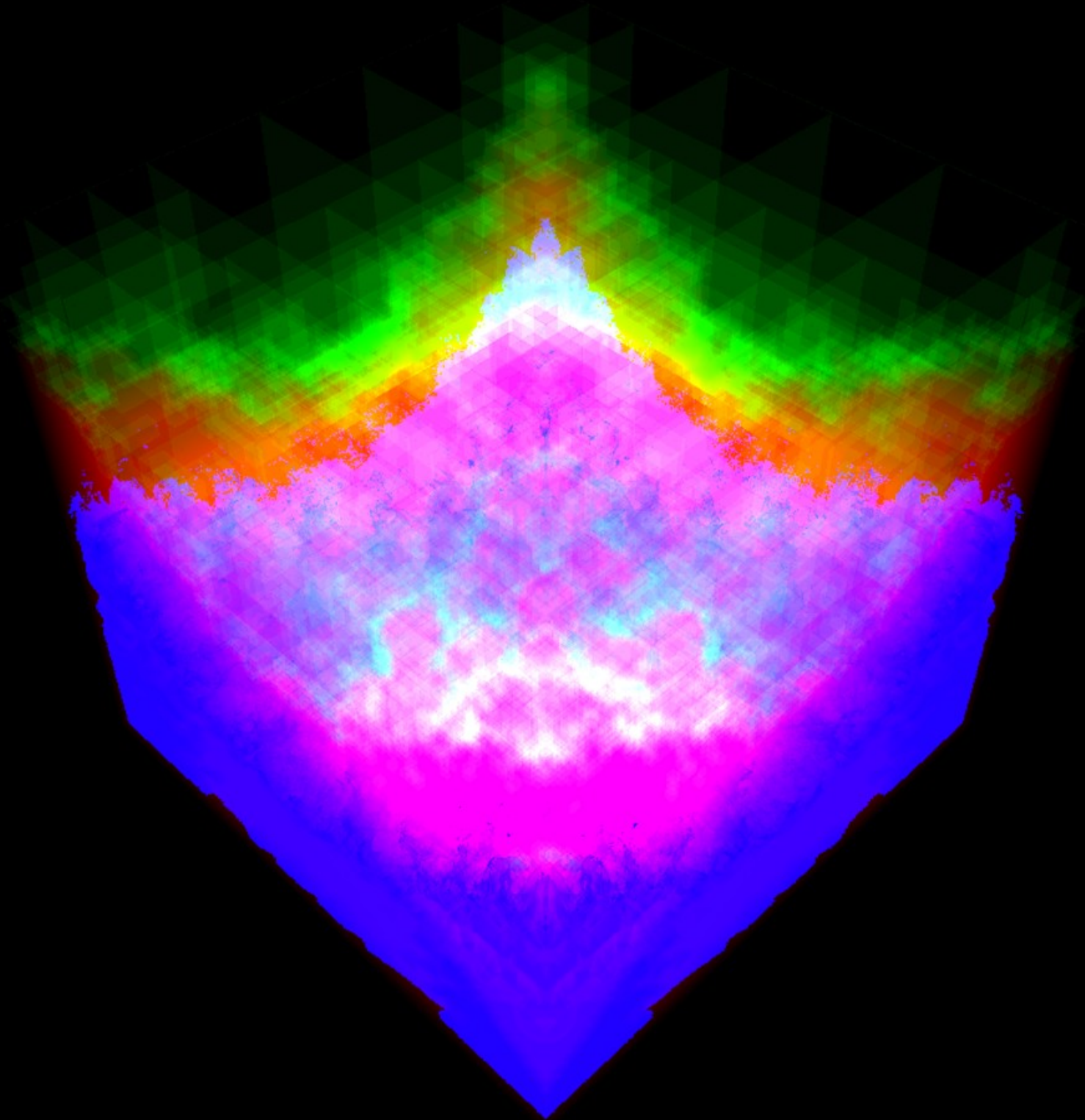
Early Ray Termination



$$\text{●} + \text{●} + \text{●} = \text{VRI}$$

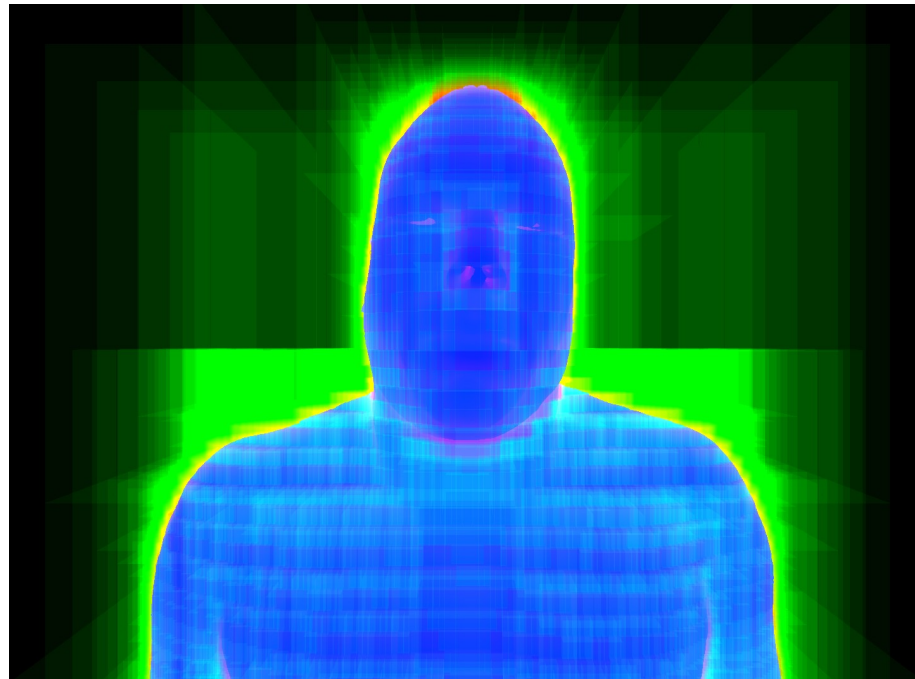
Empty Space Leaping



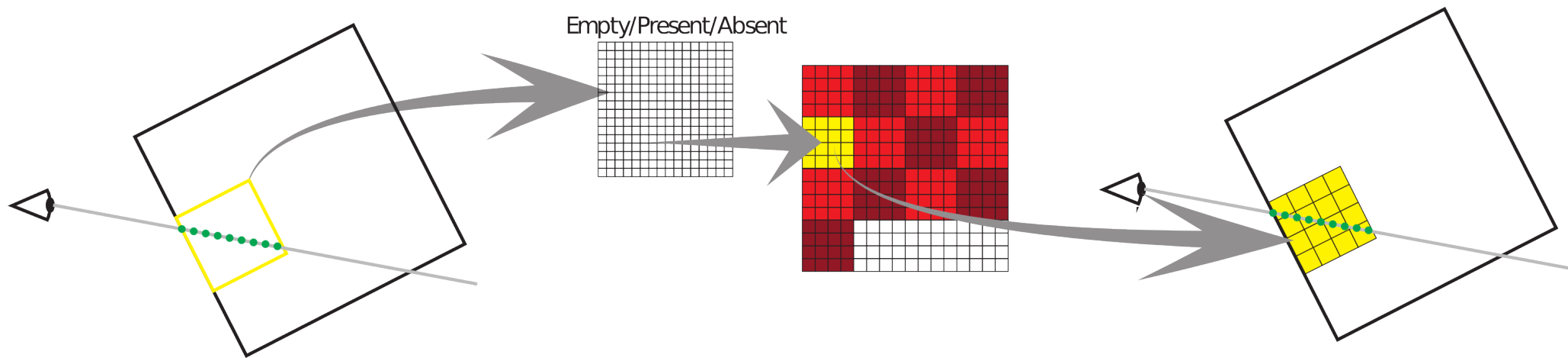


What's Important for Performance

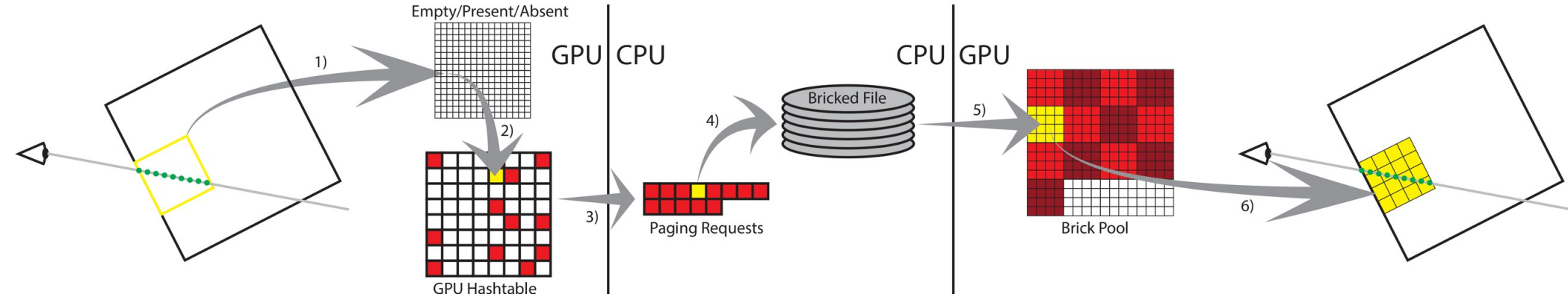
- Identifying densely-sampled regions
- Transition to coarse sampling quickly
- Communicate data needed to IO



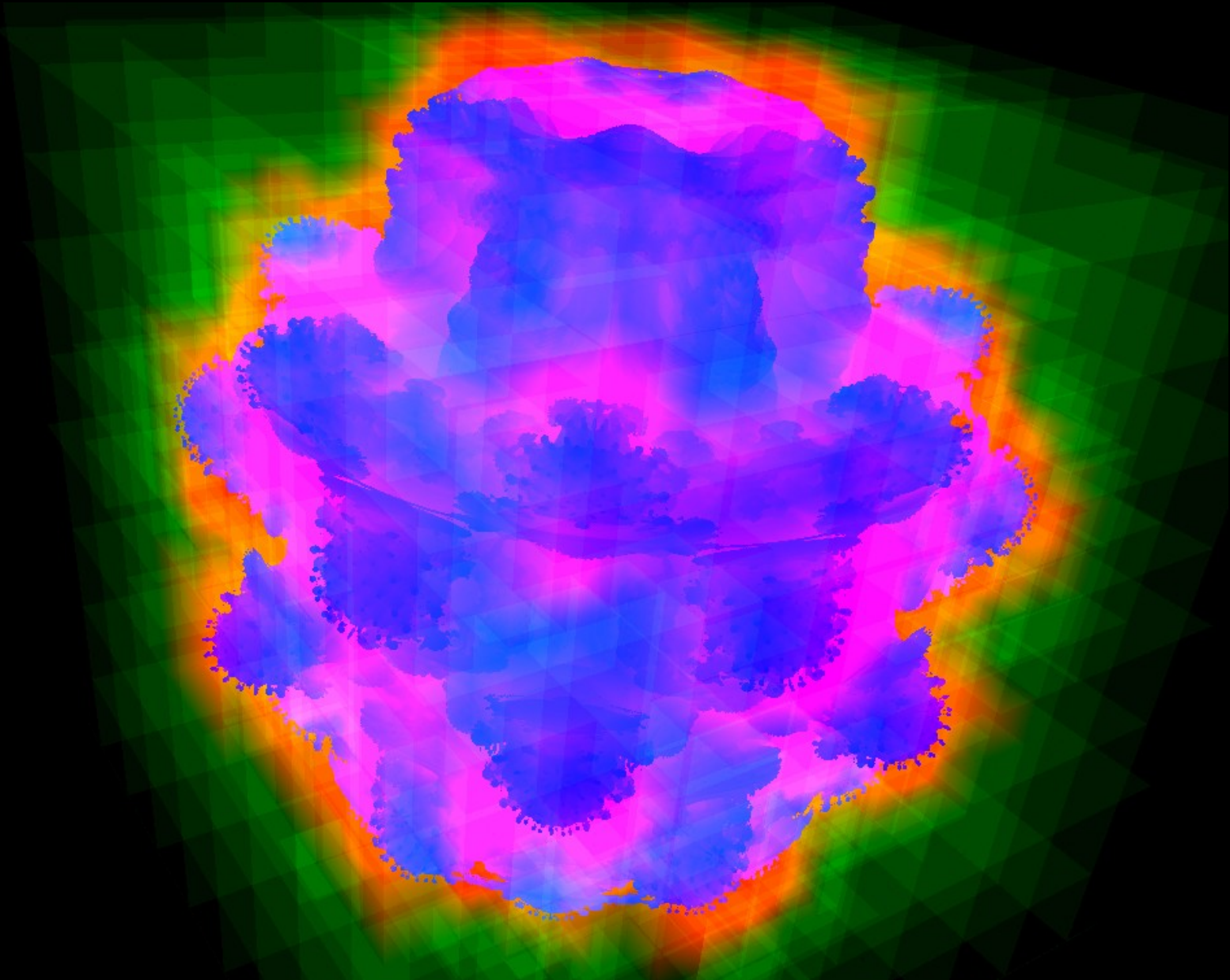
Ray-Guided Rendering



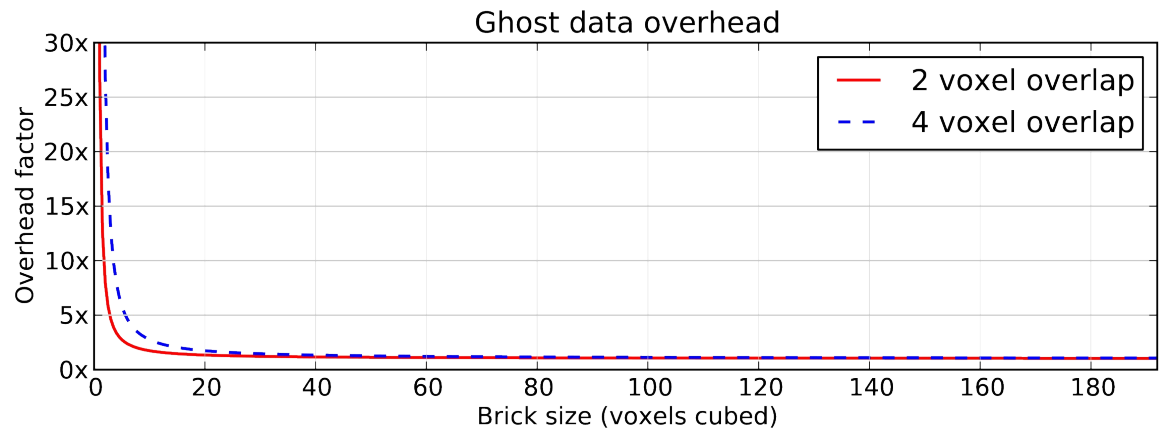
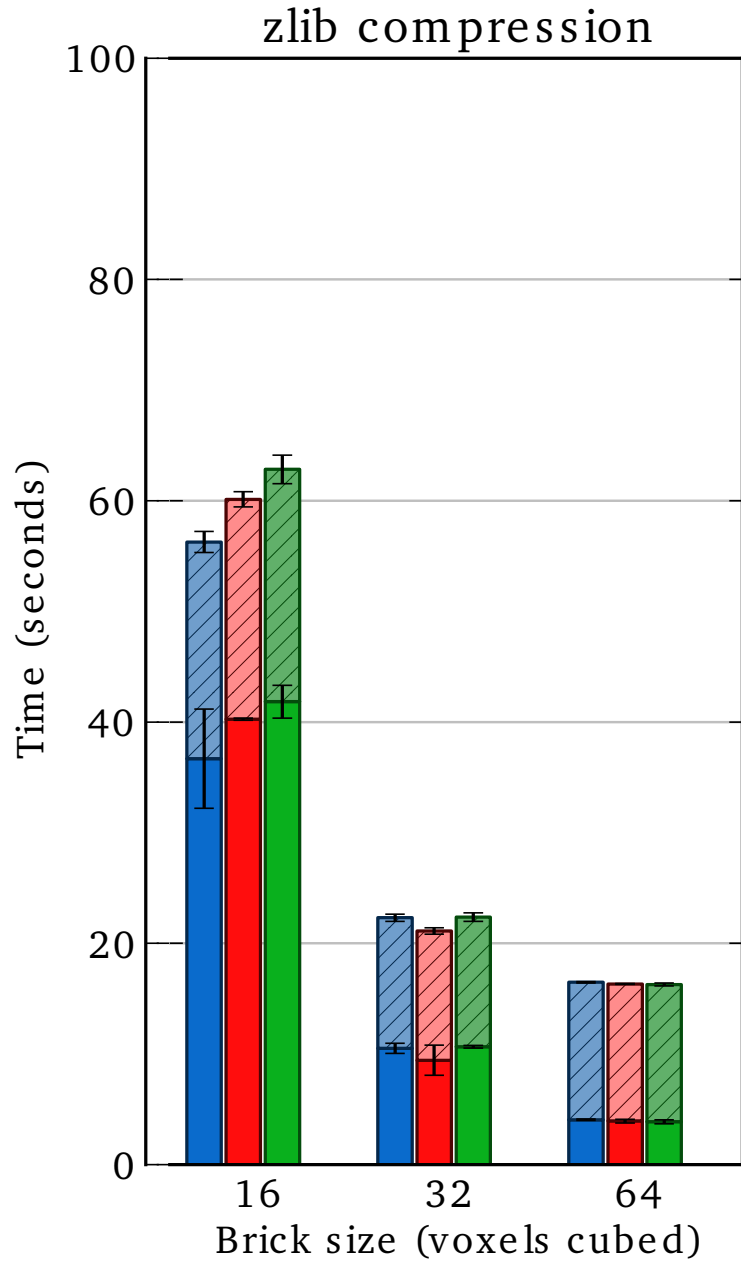
Ray-Guided Rendering



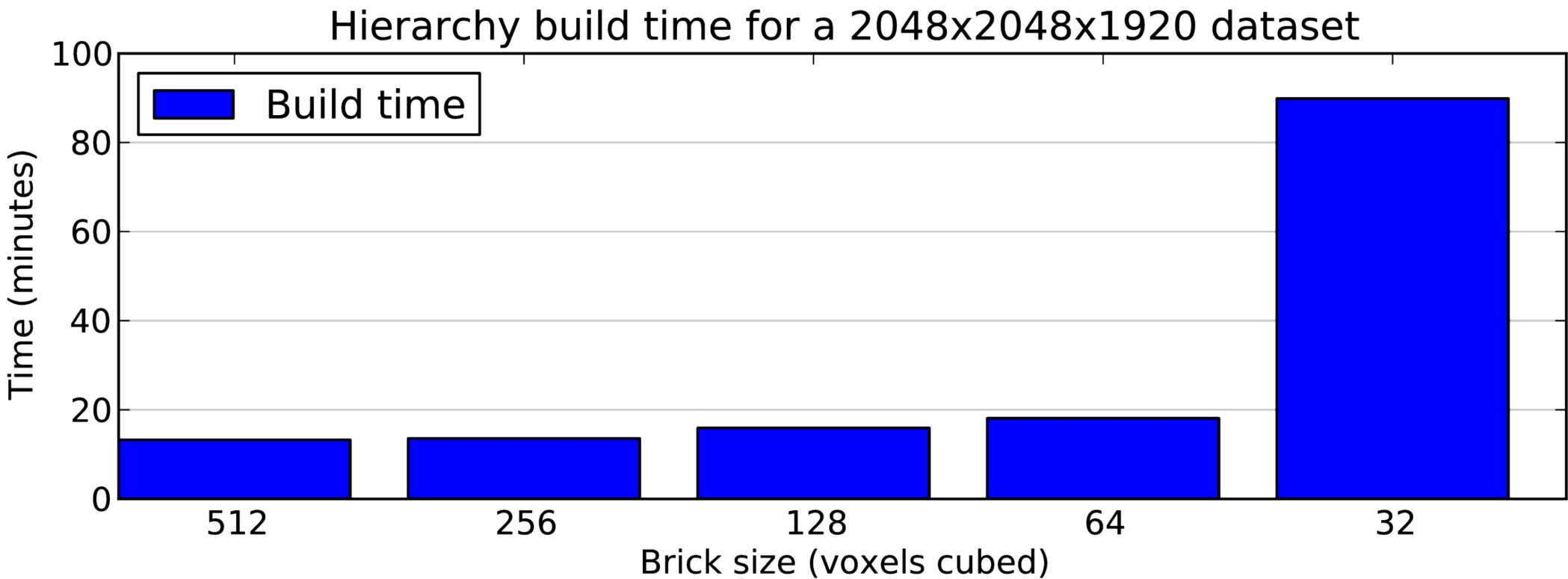
Brick Size



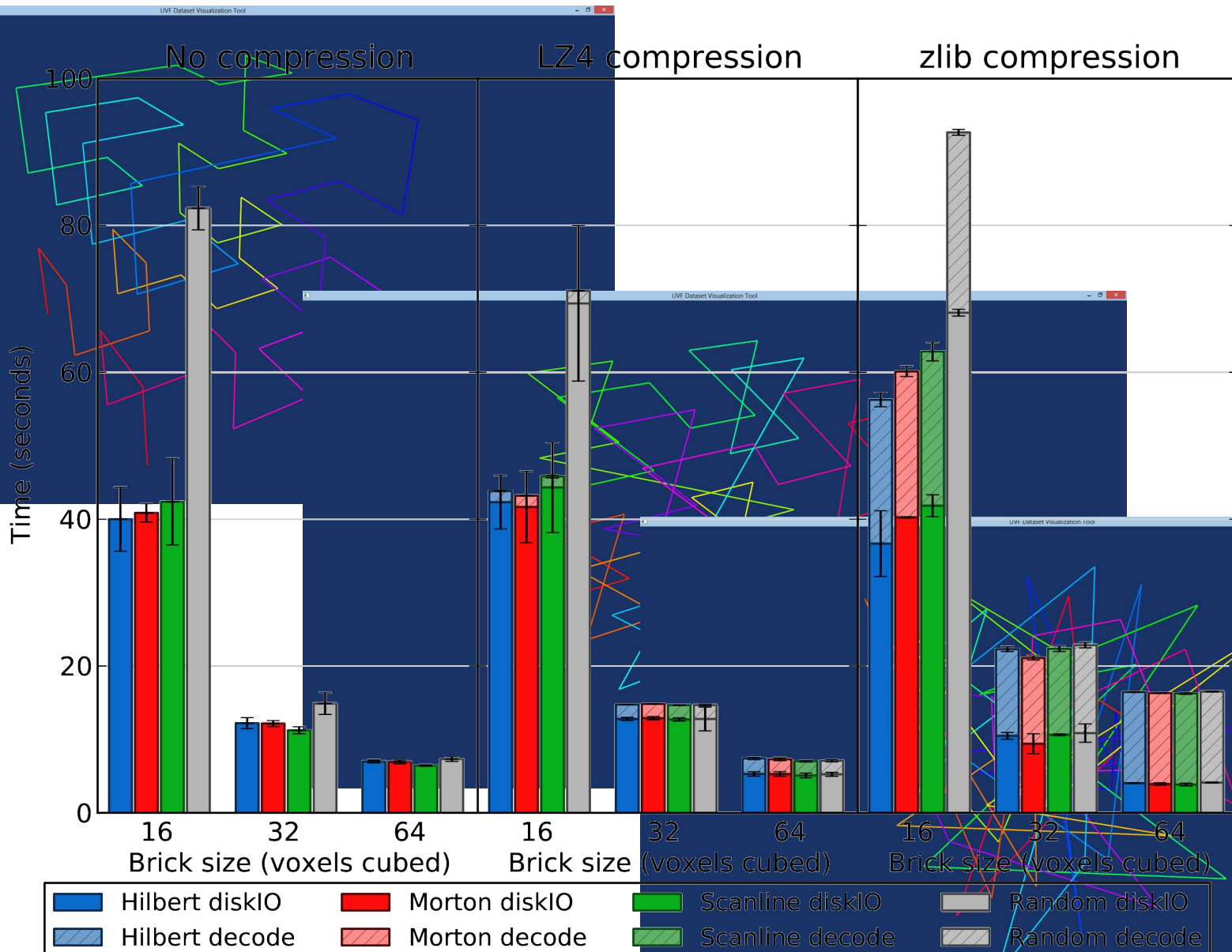
Brick Size: 10



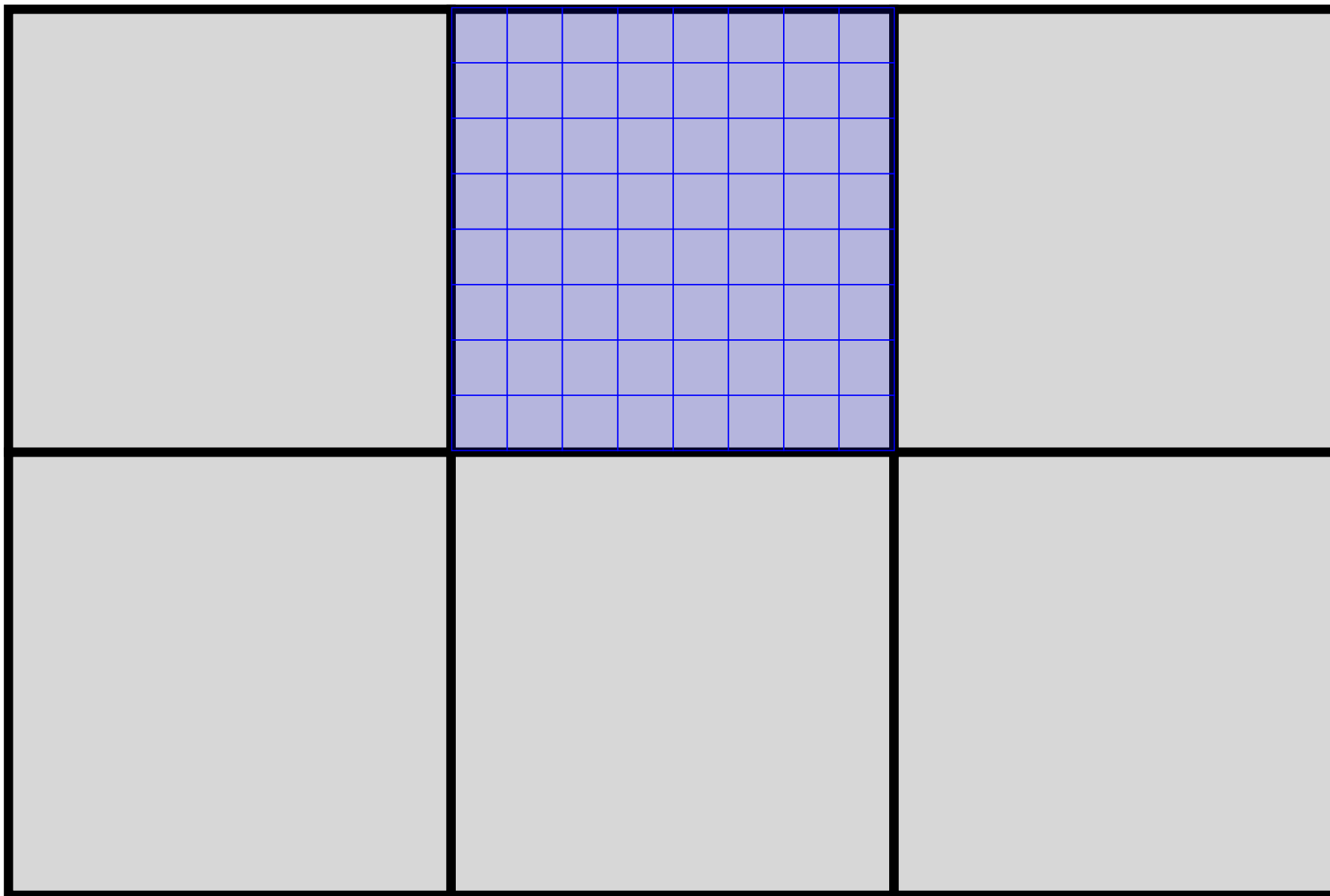
Brick Size: Reorganization



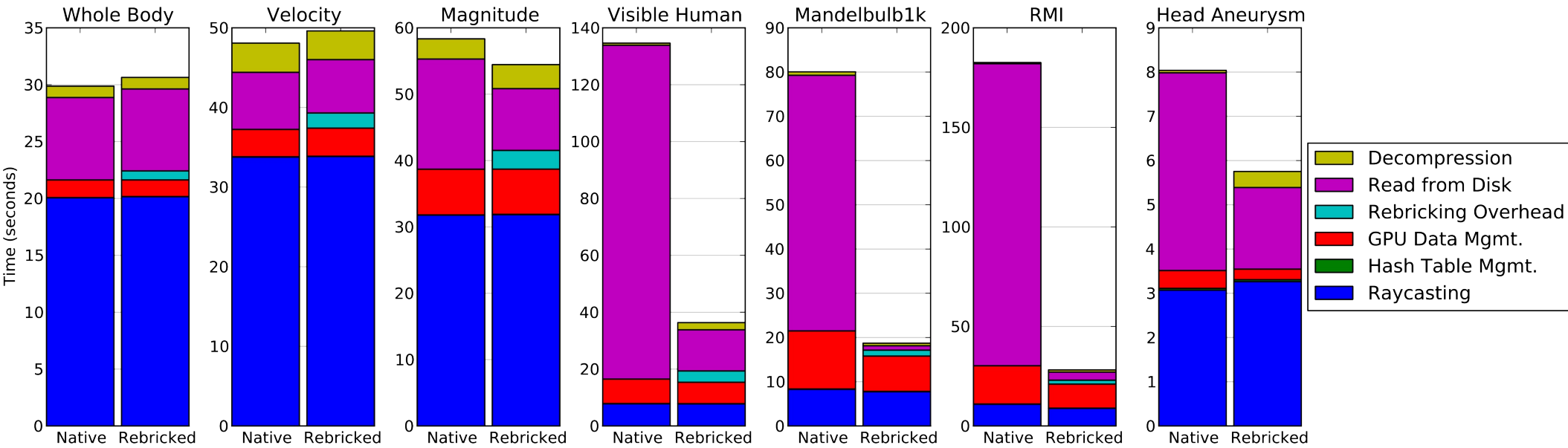
Space-Filling Curves



Dynamic Bricking

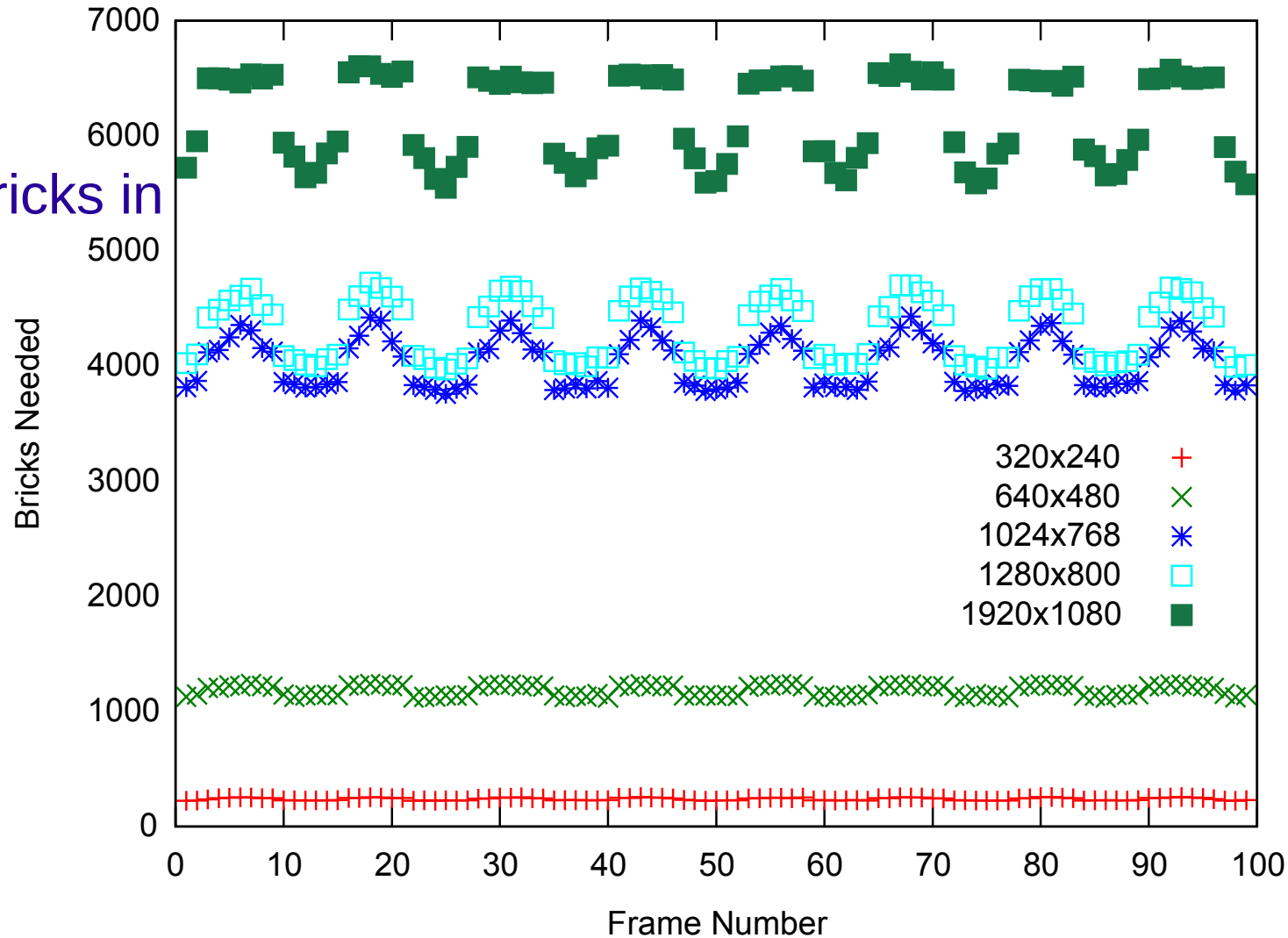


Where Does the Time Go?



Dynamic Sampling

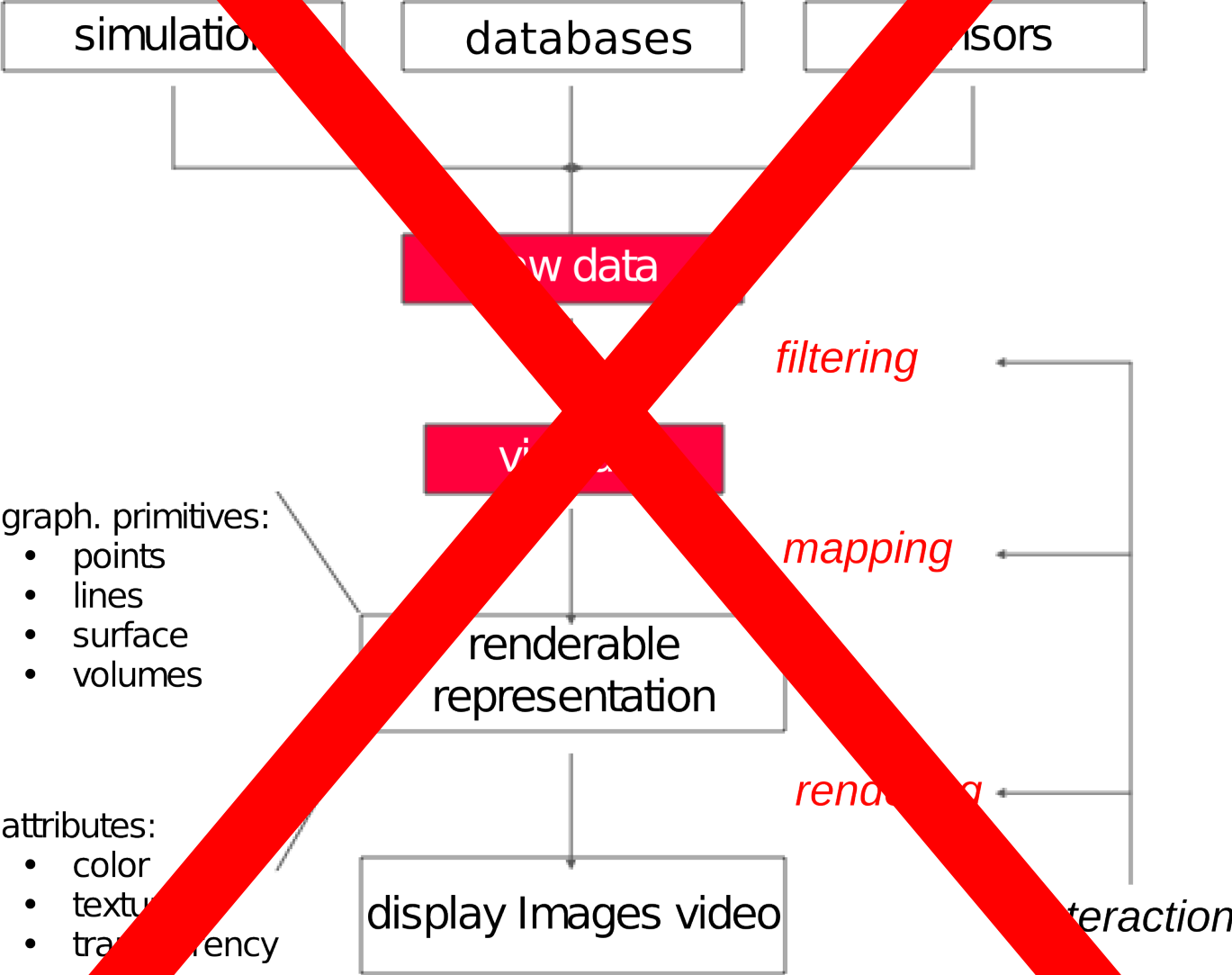
Bricks needed per frame at varying resolutions, RMI Rotation



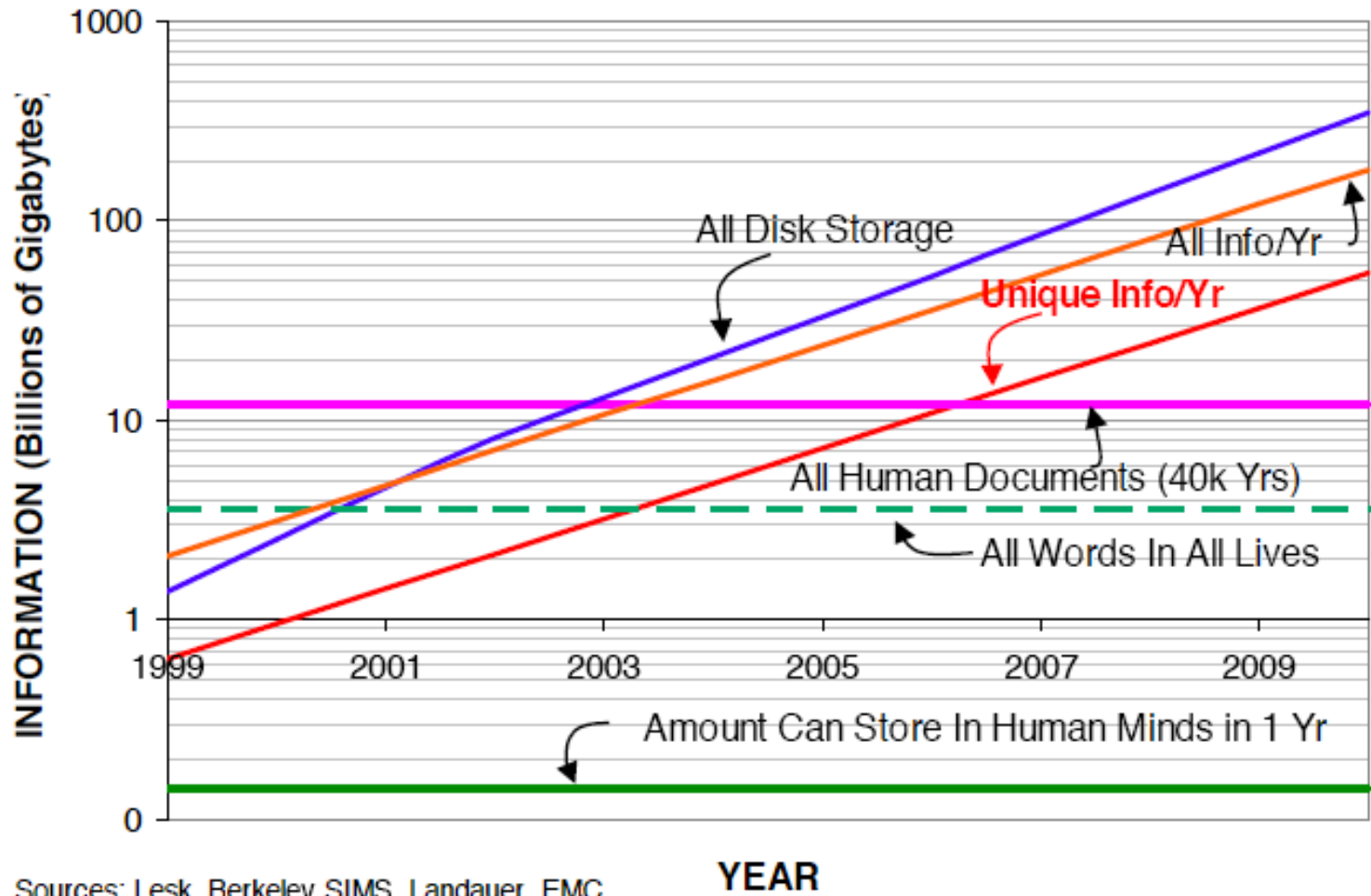
32³ brick size

~250k bricks in Dataset!

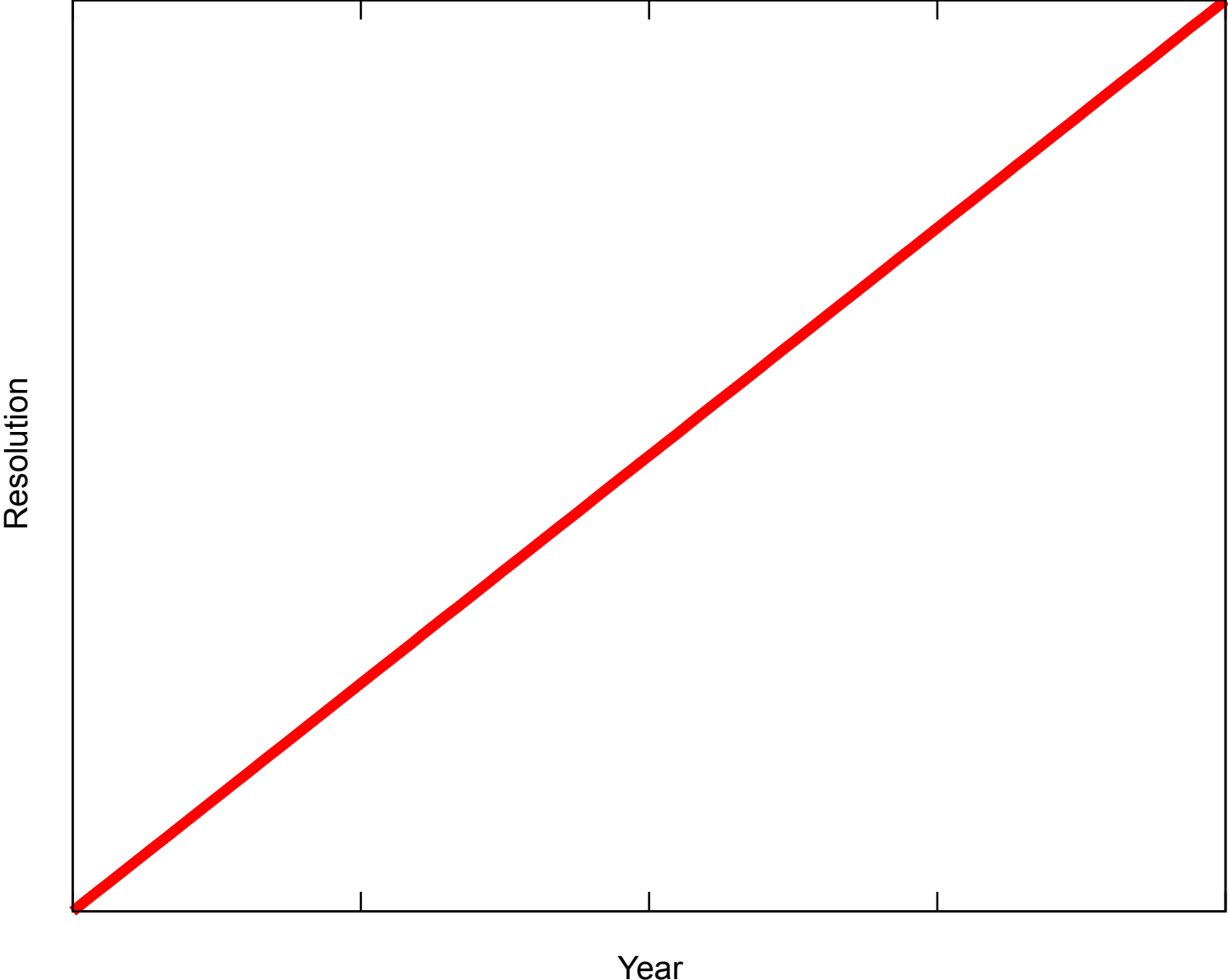
Vis Pipeline



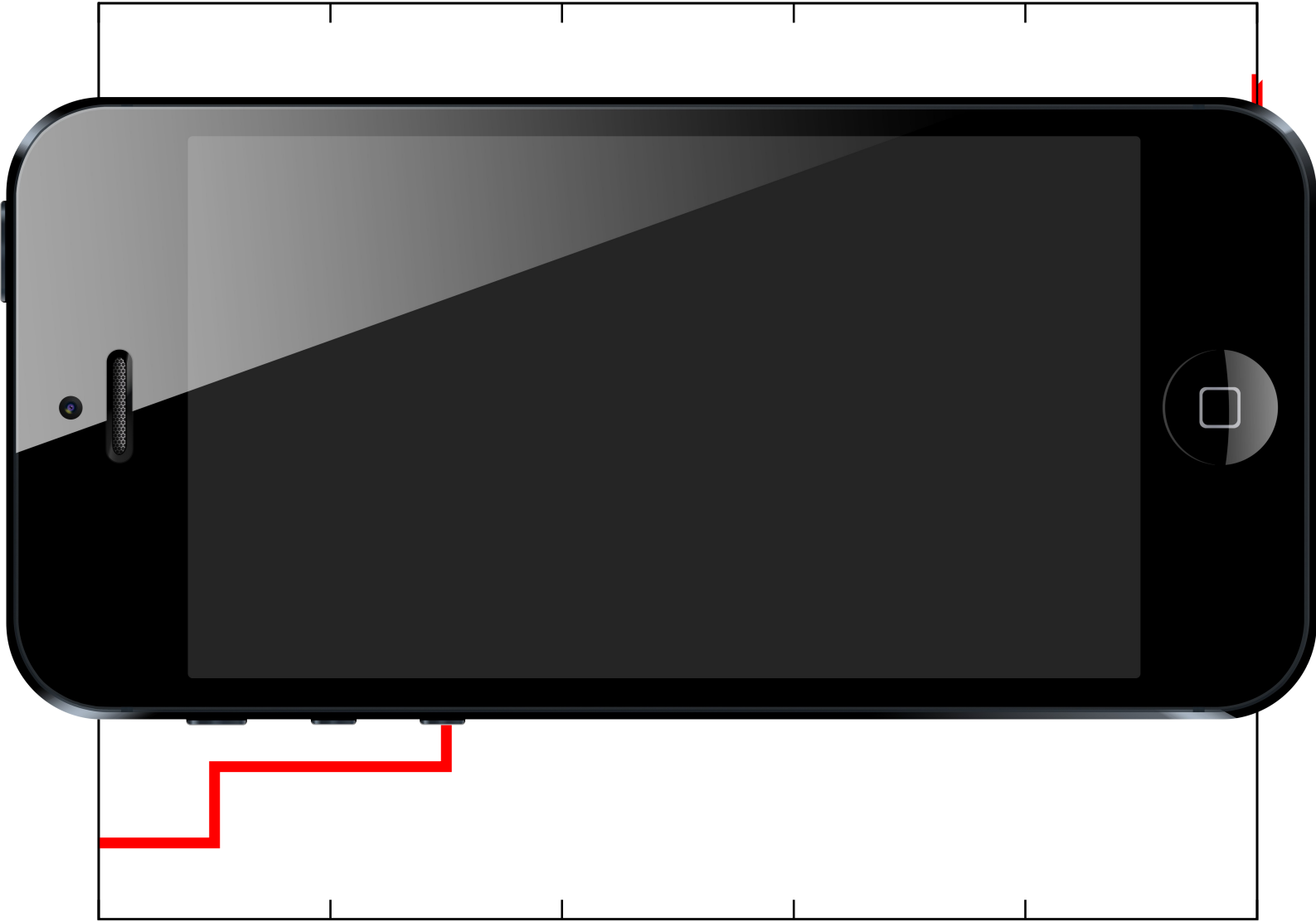
Growth of Data



Growth of Display Devices

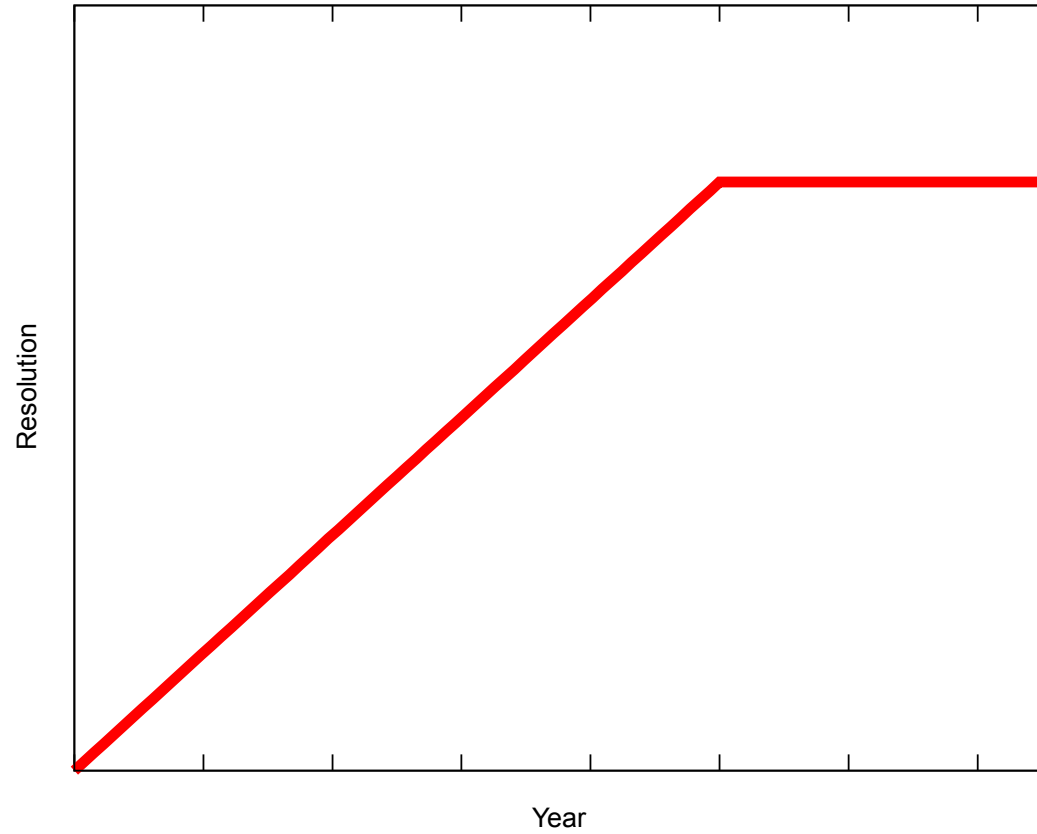
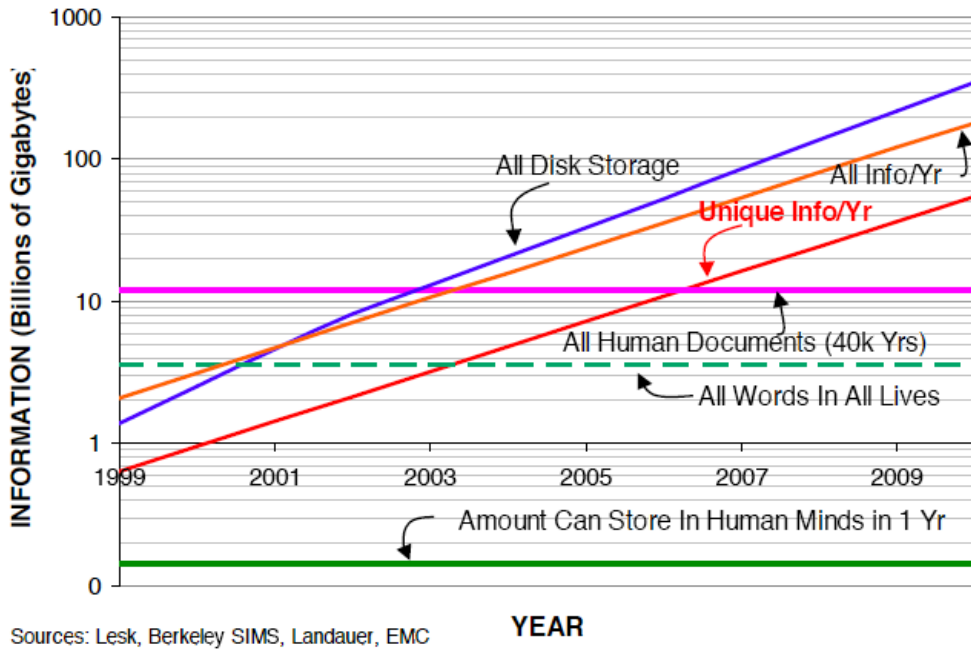


Growth of Display Devices

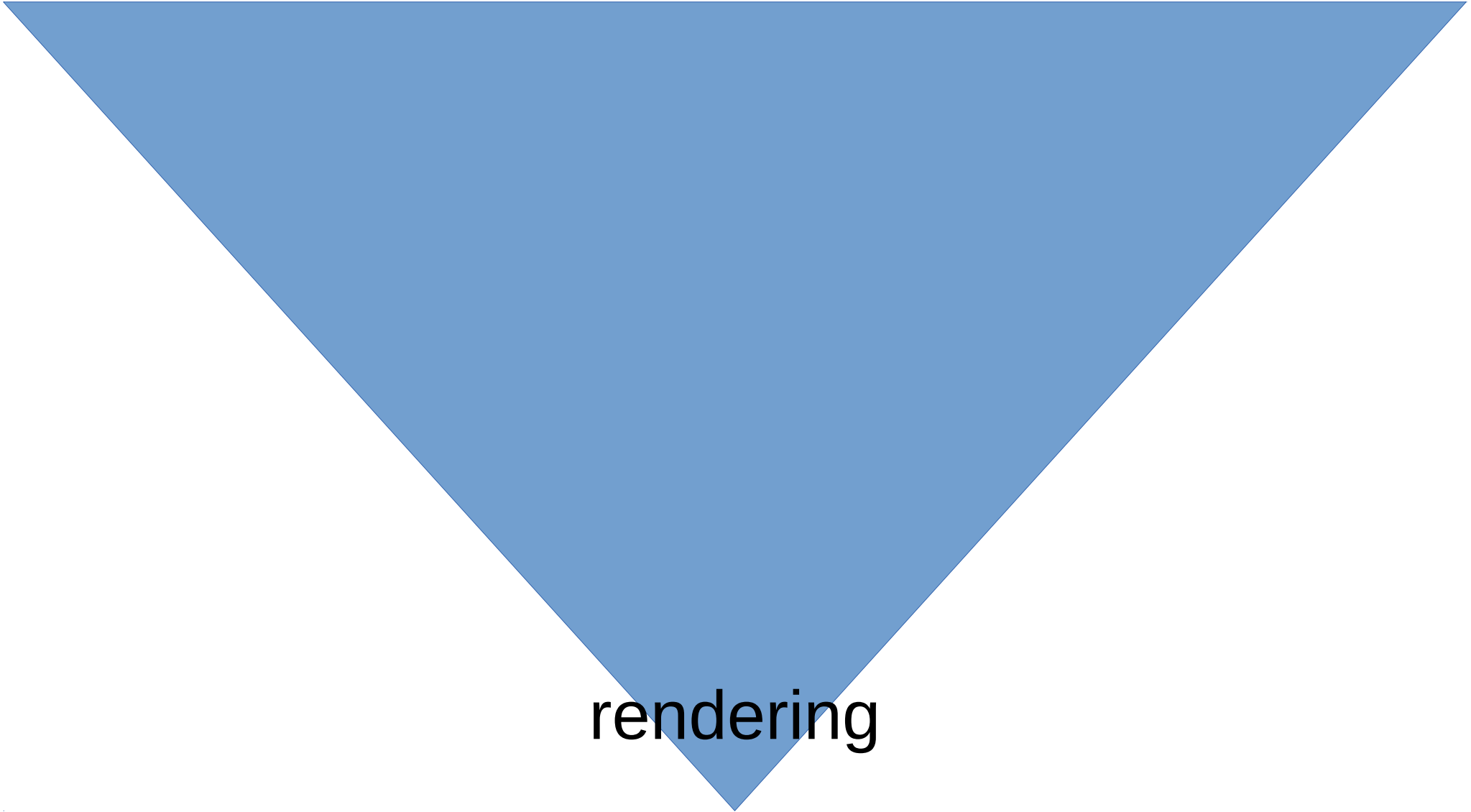


Year

Growth



Data

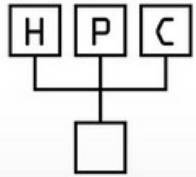


rendering

Rendering

==

Filtering



High
Performance
Computing

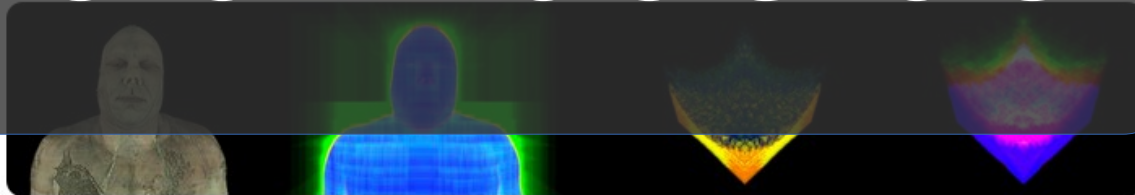
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AN ANALYSIS OF SCALABLE GPU-BASED RAY-GUIDED VOLUME RENDERING

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ABSTRACT

Volume rendering continues to be a critical method for analyzing large-scale scalar fields, in disciplines as diverse as biomedical engineering and computational fluid dynamics. Commodity desktop hardware has struggled to keep pace with data size increases, challenging modern visualization software to deliver responsive interactions for $O(N^3)$ algorithms such as volume rendering. We target the data type common in

Questions?