

CCMC-LIU-AMNH PARTNERSHIP: ADVANCED VISUALIZATION

Alexander Bock
Scientific Visualization Group
Linköping University
Sweden

WHO AM I

- 4th year PhD student in Scientific Visualization
- Collaborating with CCMC since 2012

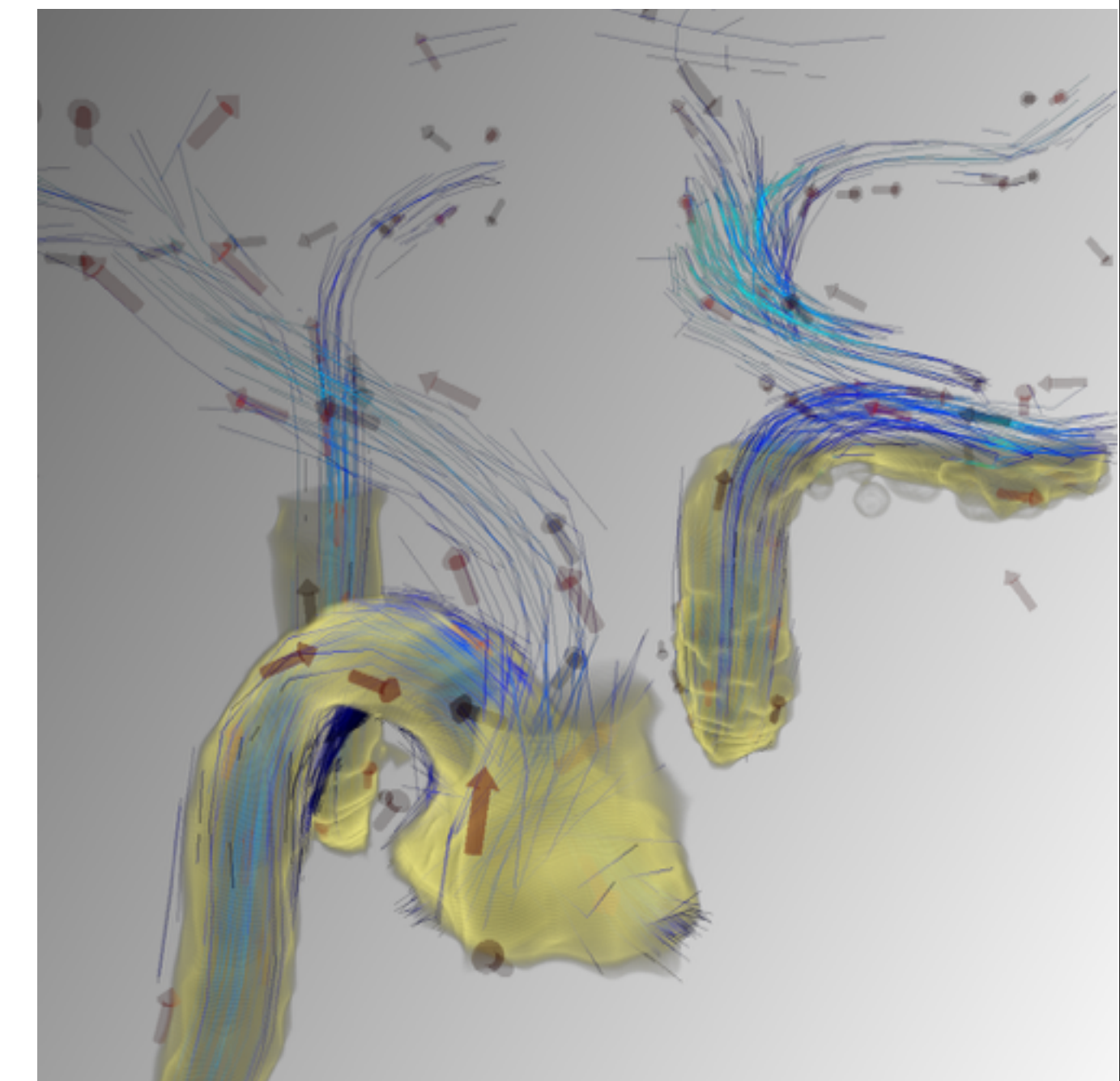
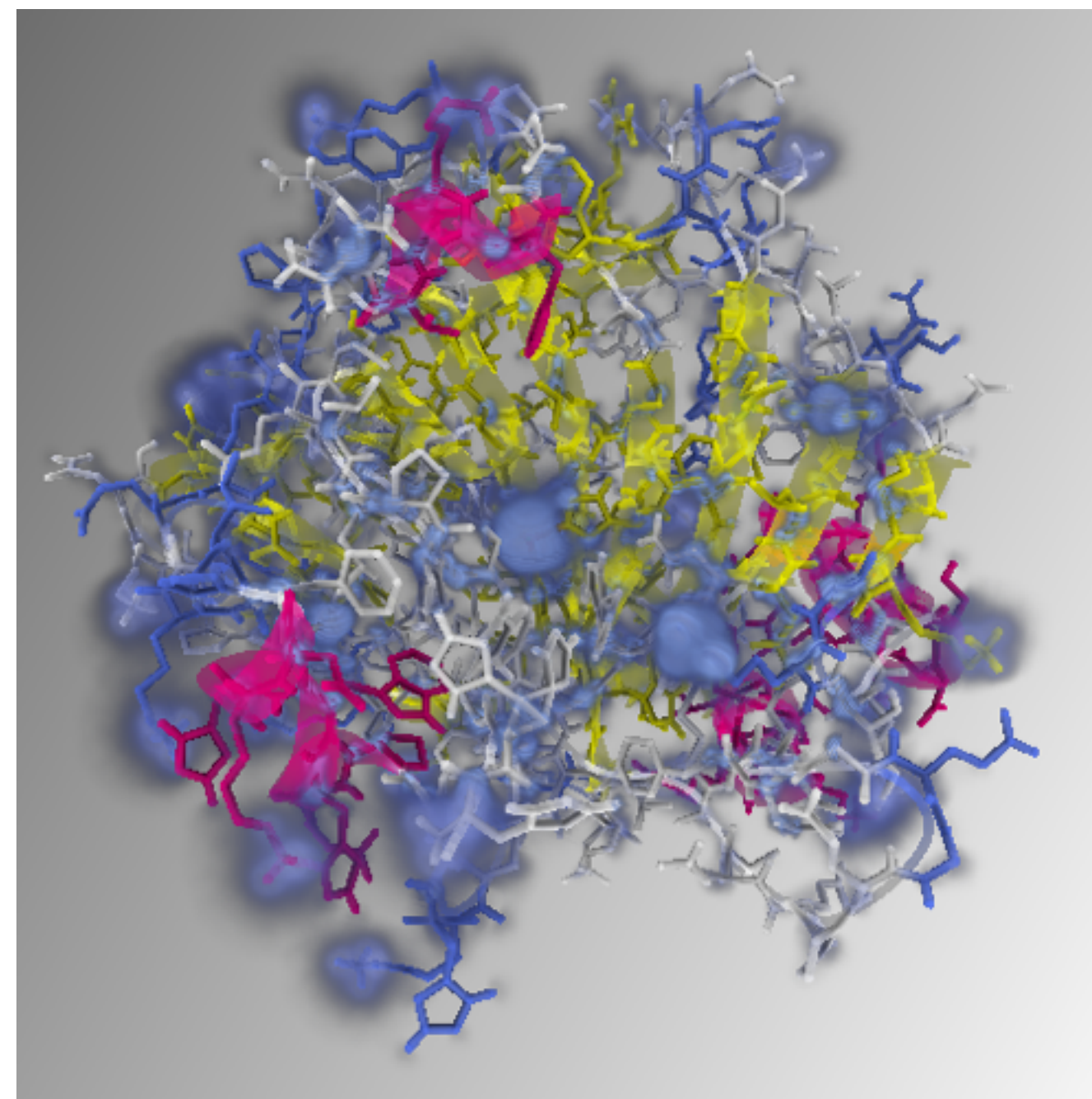
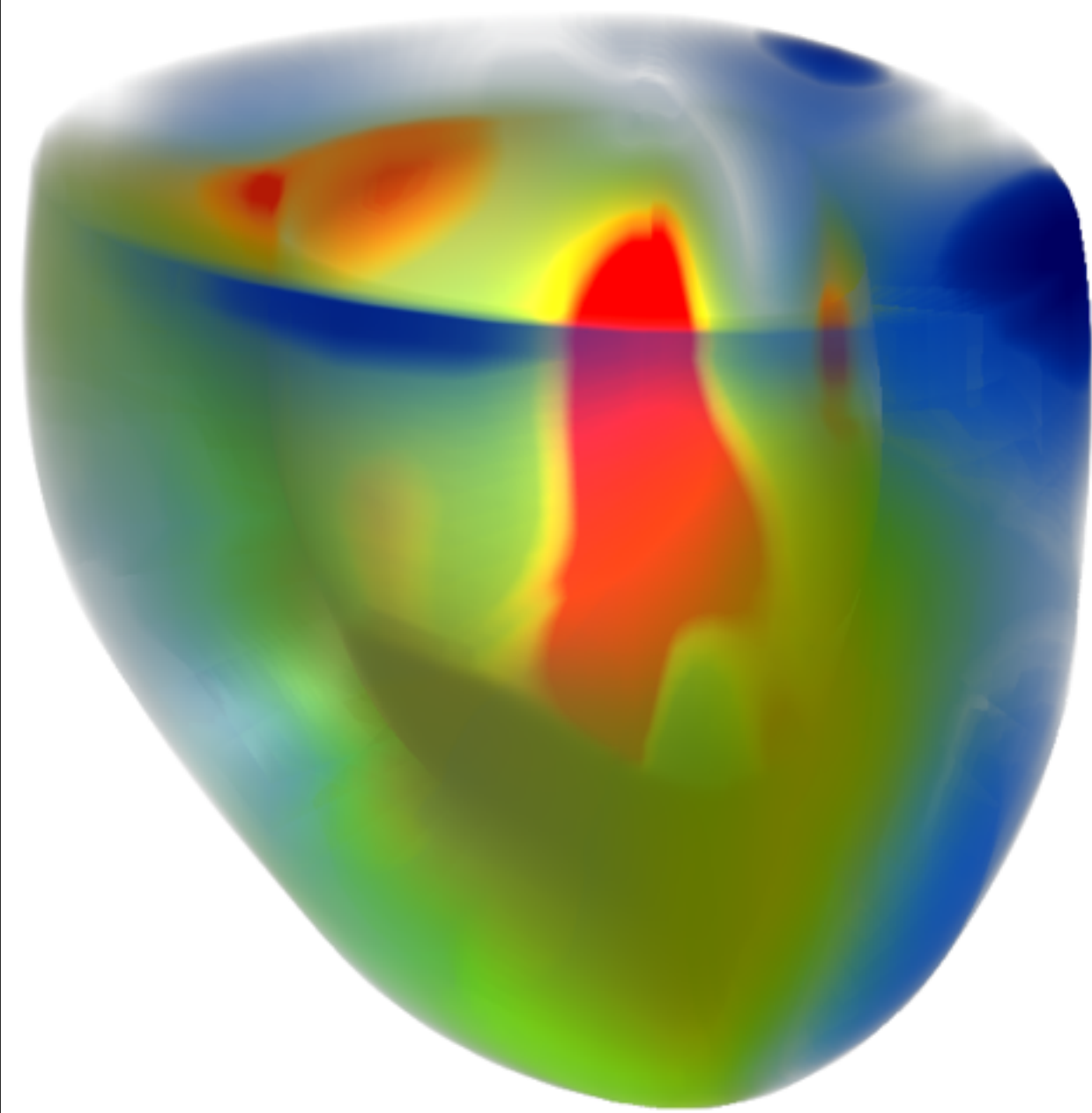


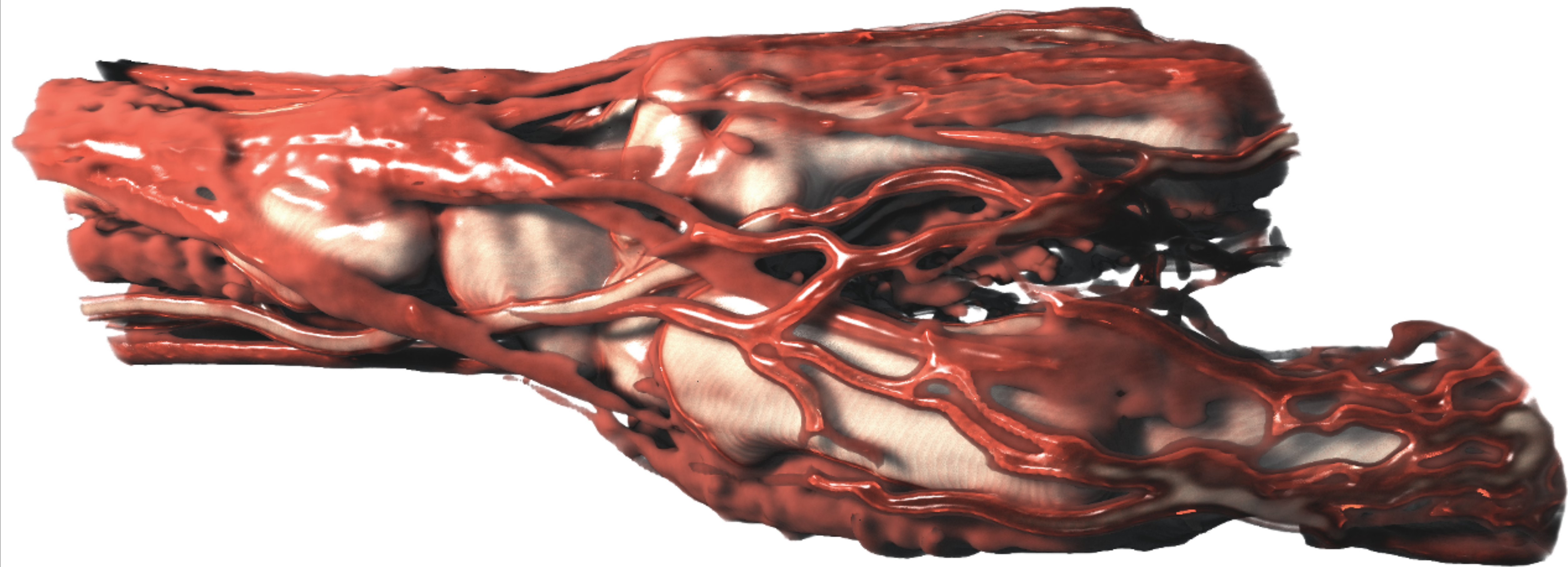
WHAT IS SCIENTIFIC VISUALIZATION?

- “The purpose [...] is to graphically illustrate scientific data to enable scientists to understand, illustrate, and glean insight from their data.” (*wikipedia.org*)

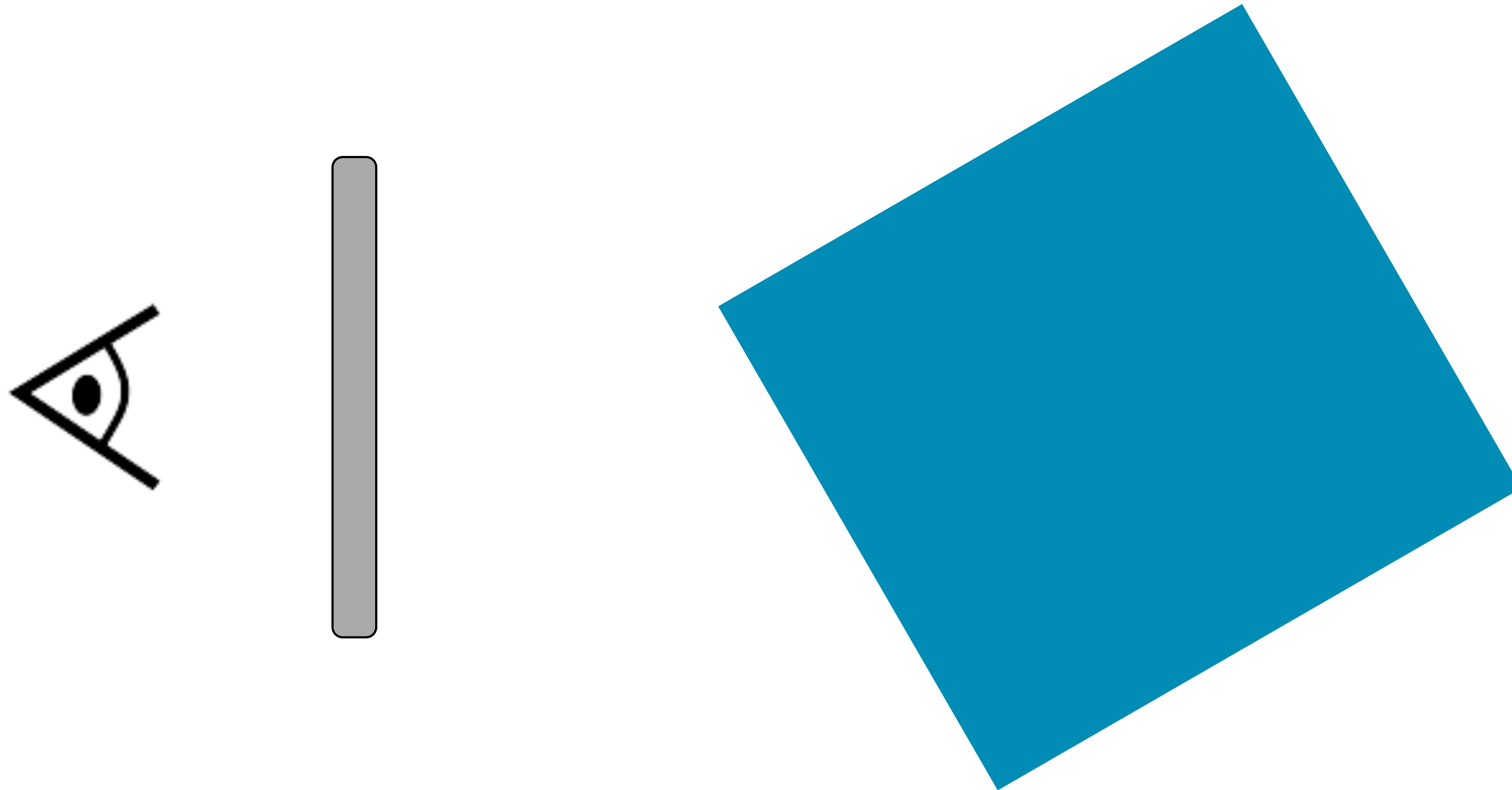
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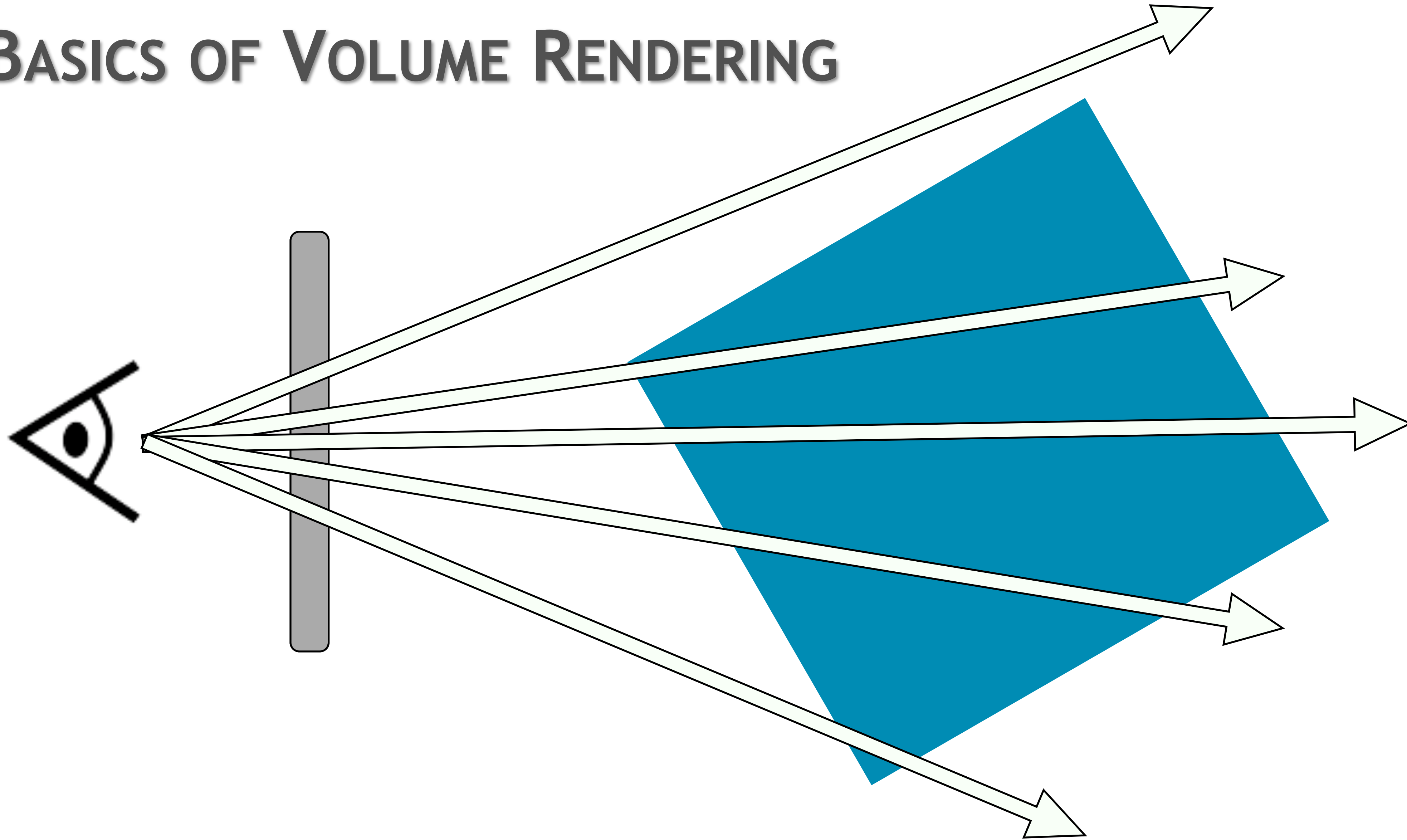




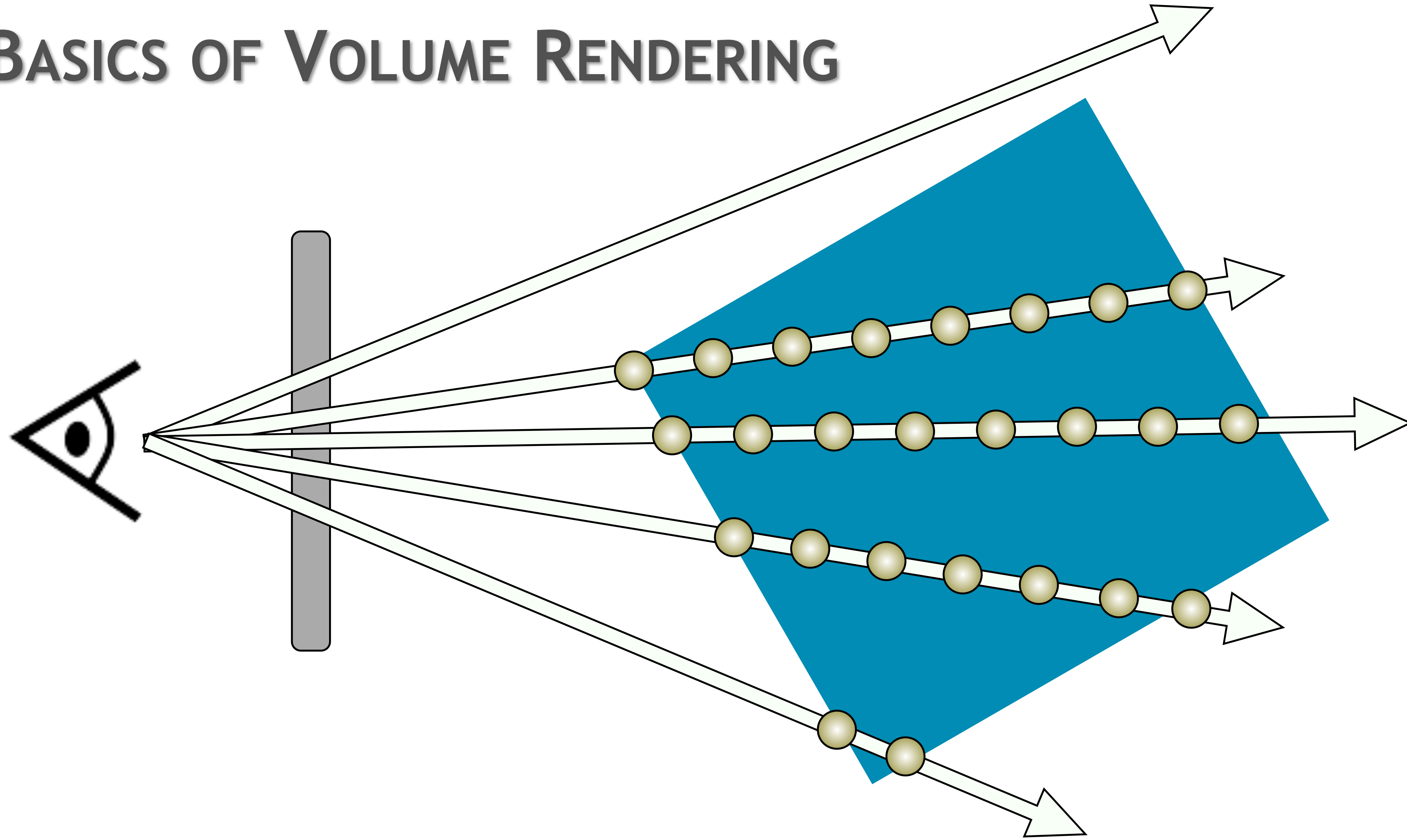
BASICS OF VOLUME RENDERING



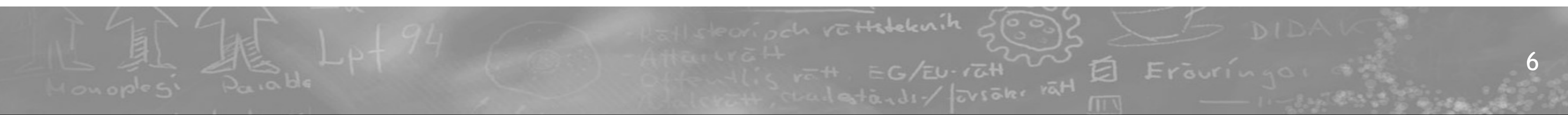
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WHAT HAS BEEN...

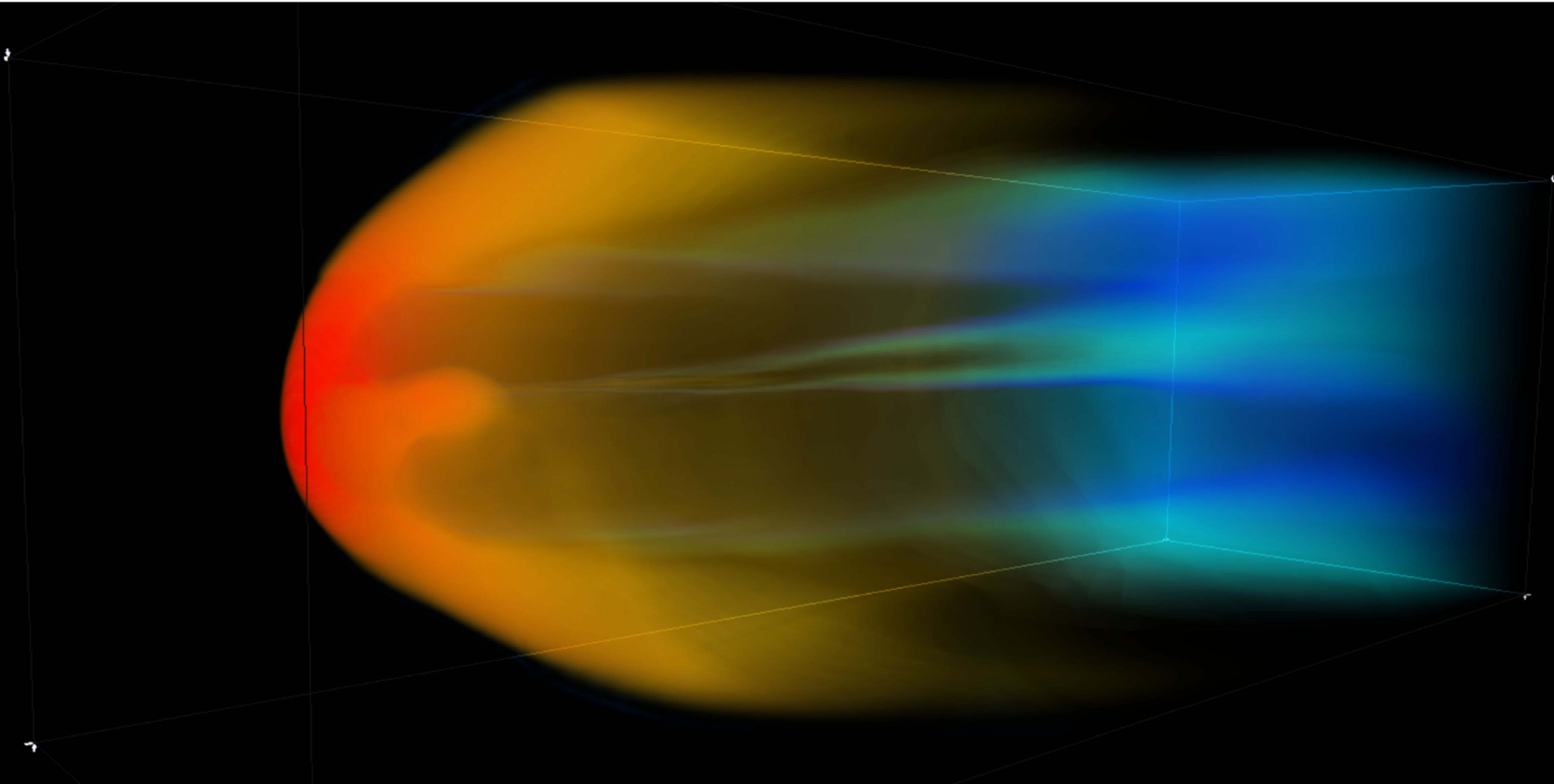


MARTIN TÖRNROS

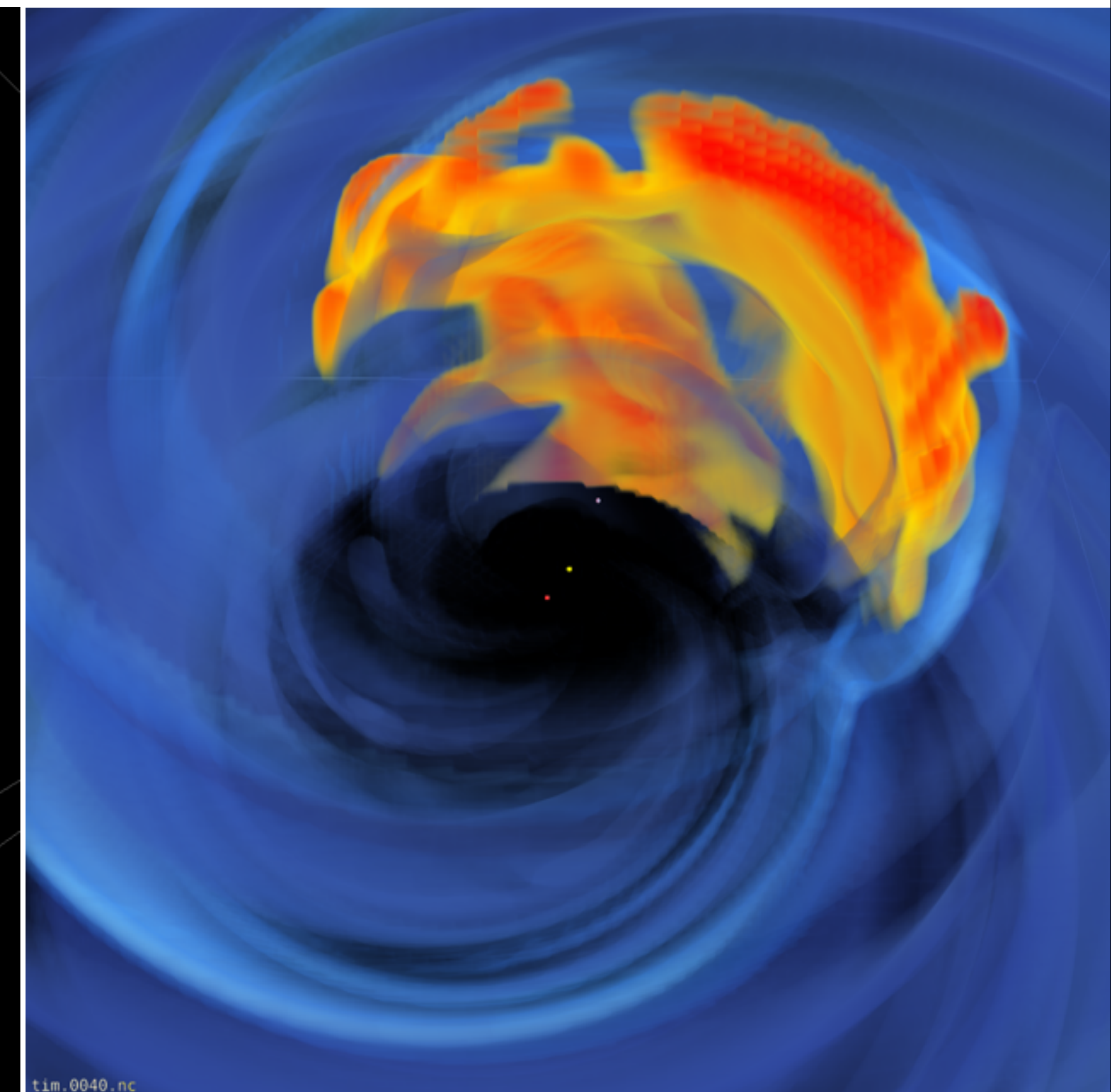
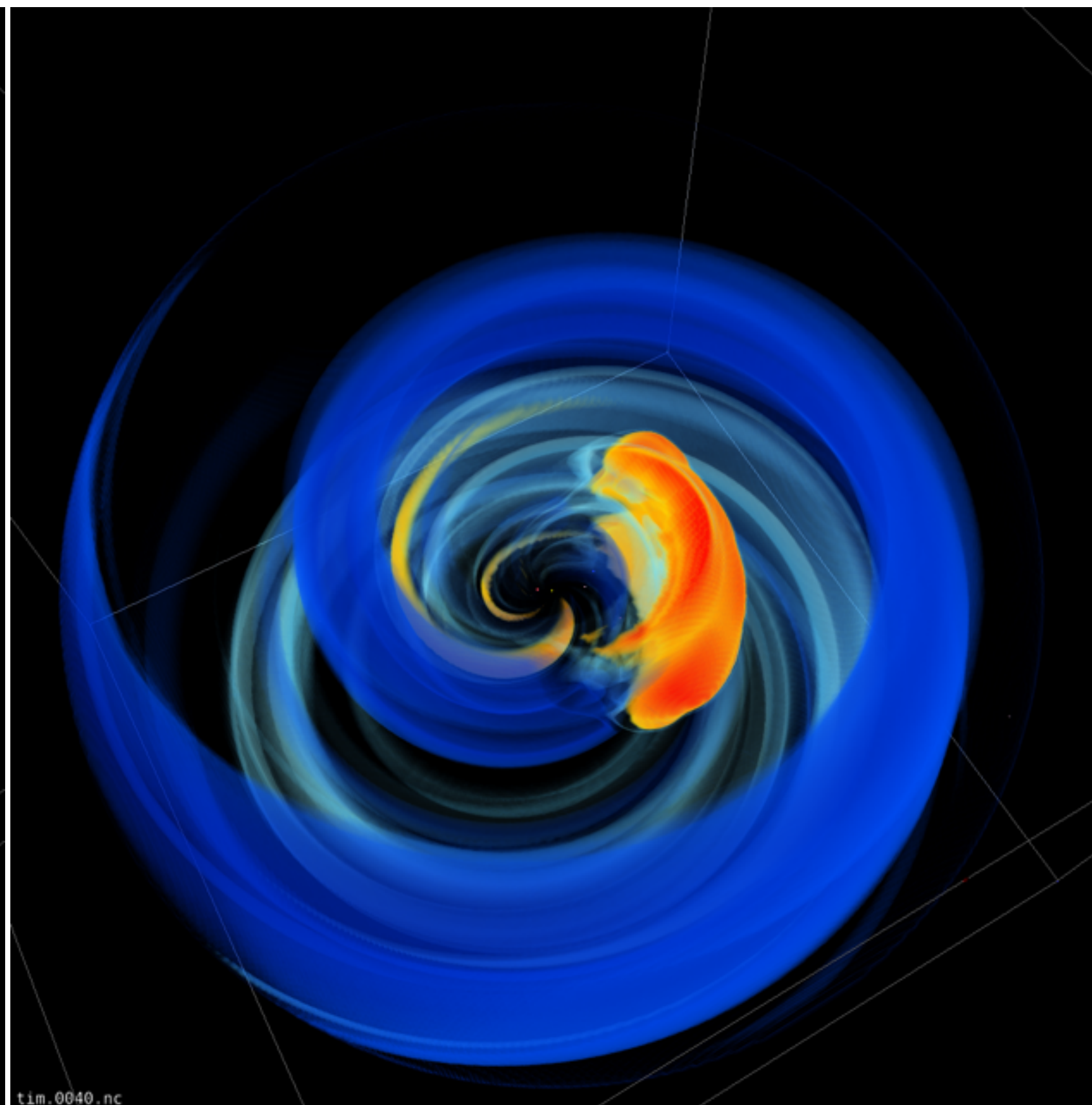
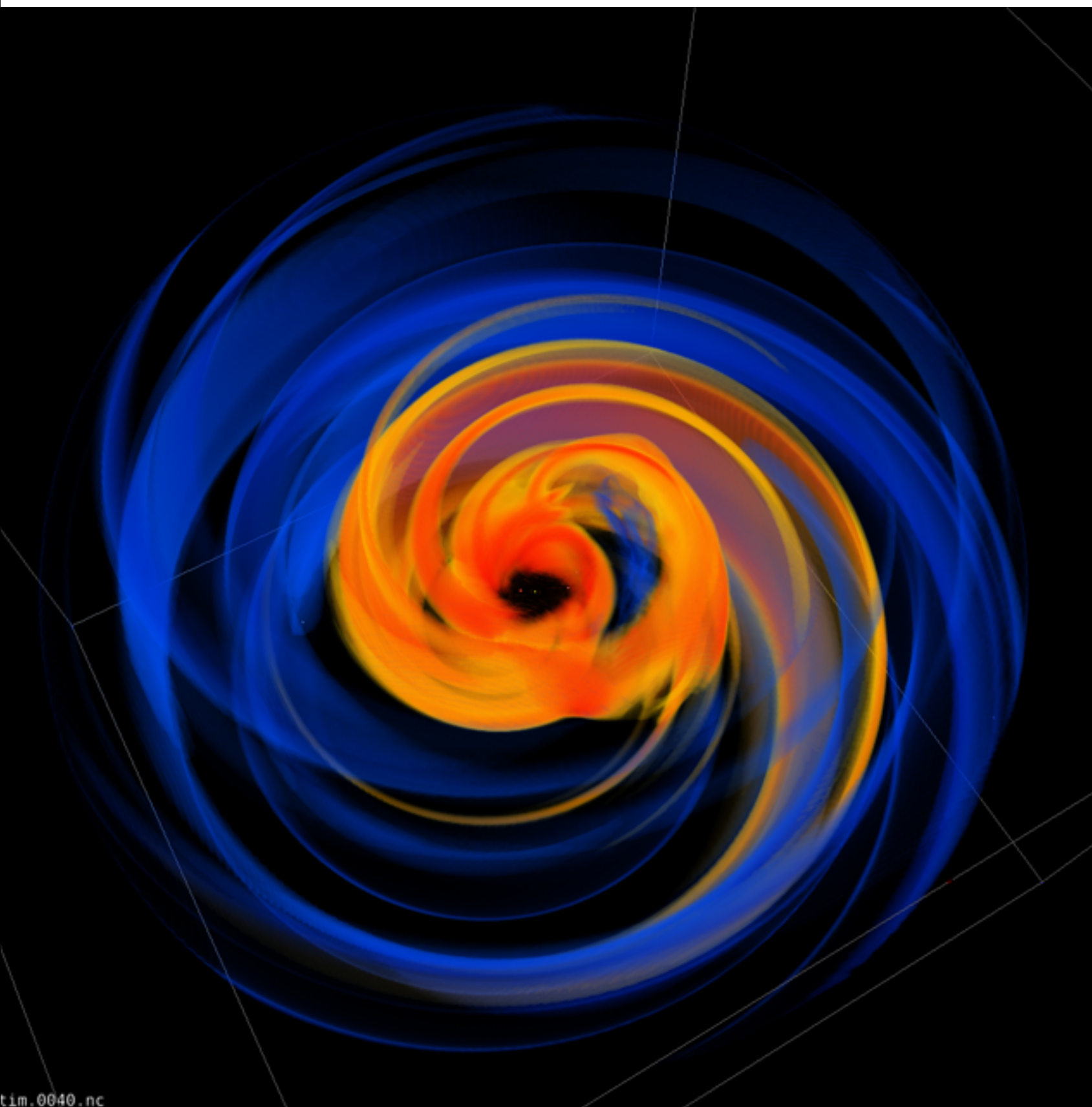


Interactive Visualization of Space Weather Data

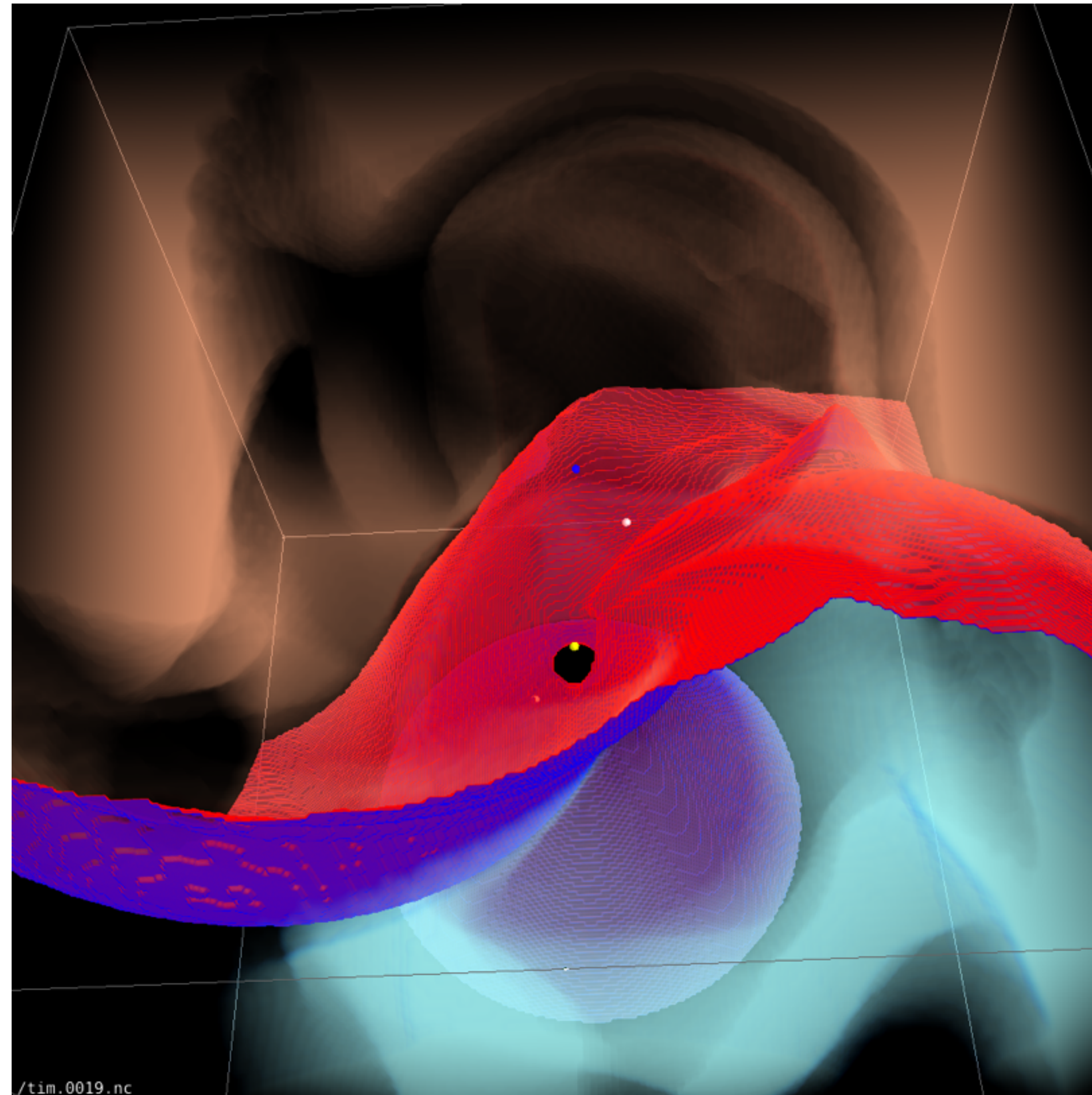
INTERACTIVE VISUALIZATION OF SPACE WEATHER DATA



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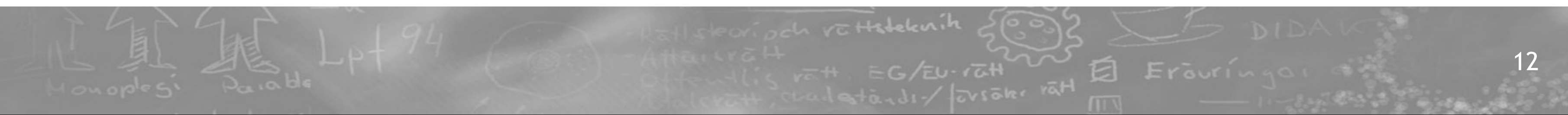


VICTOR SAND



Dynamic Visualization of Space Weather Data

INTERACTIVITY



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- Volume (512 x 512 x 512 voxels * 1 byte/voxel \approx 128MiB)

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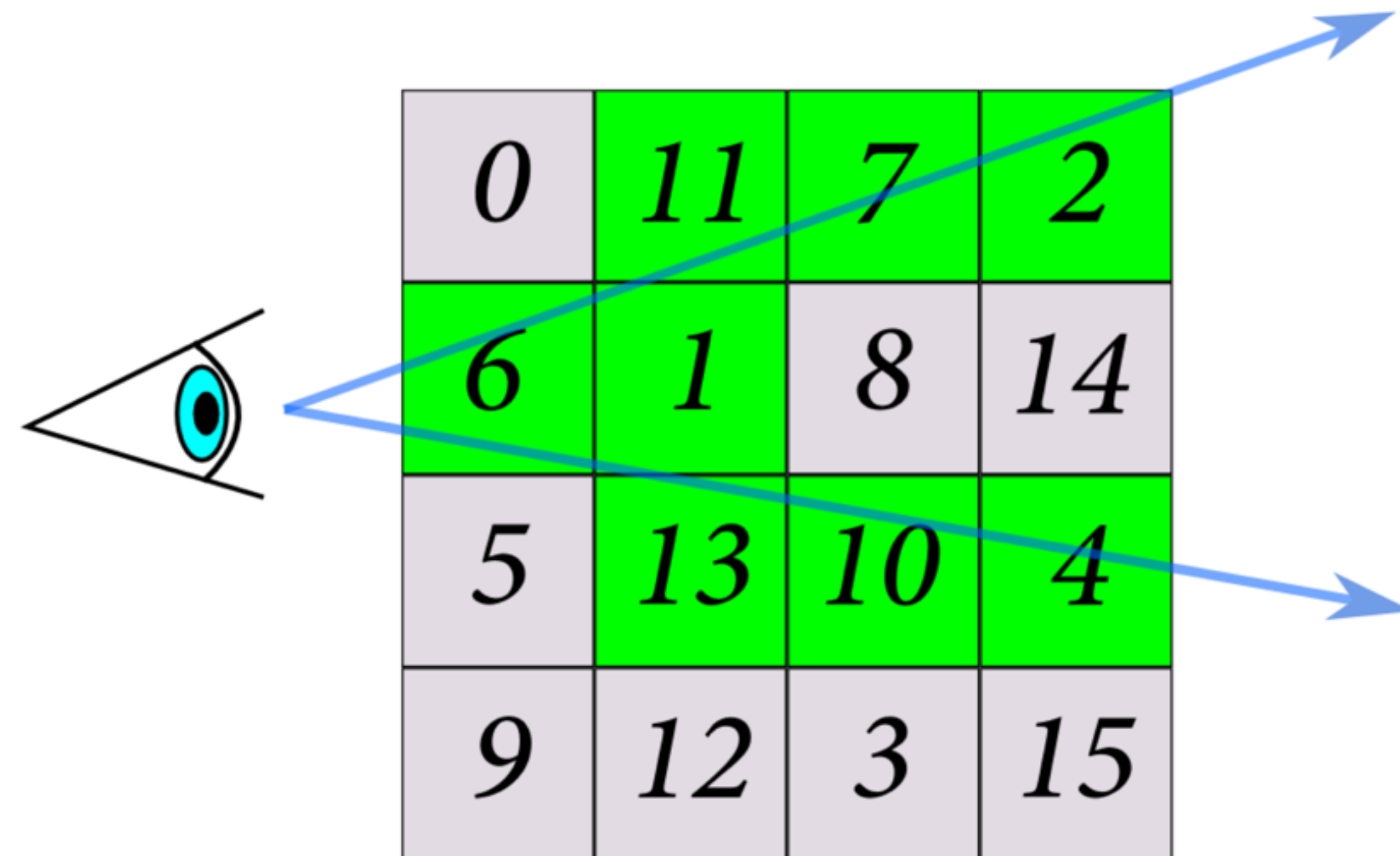
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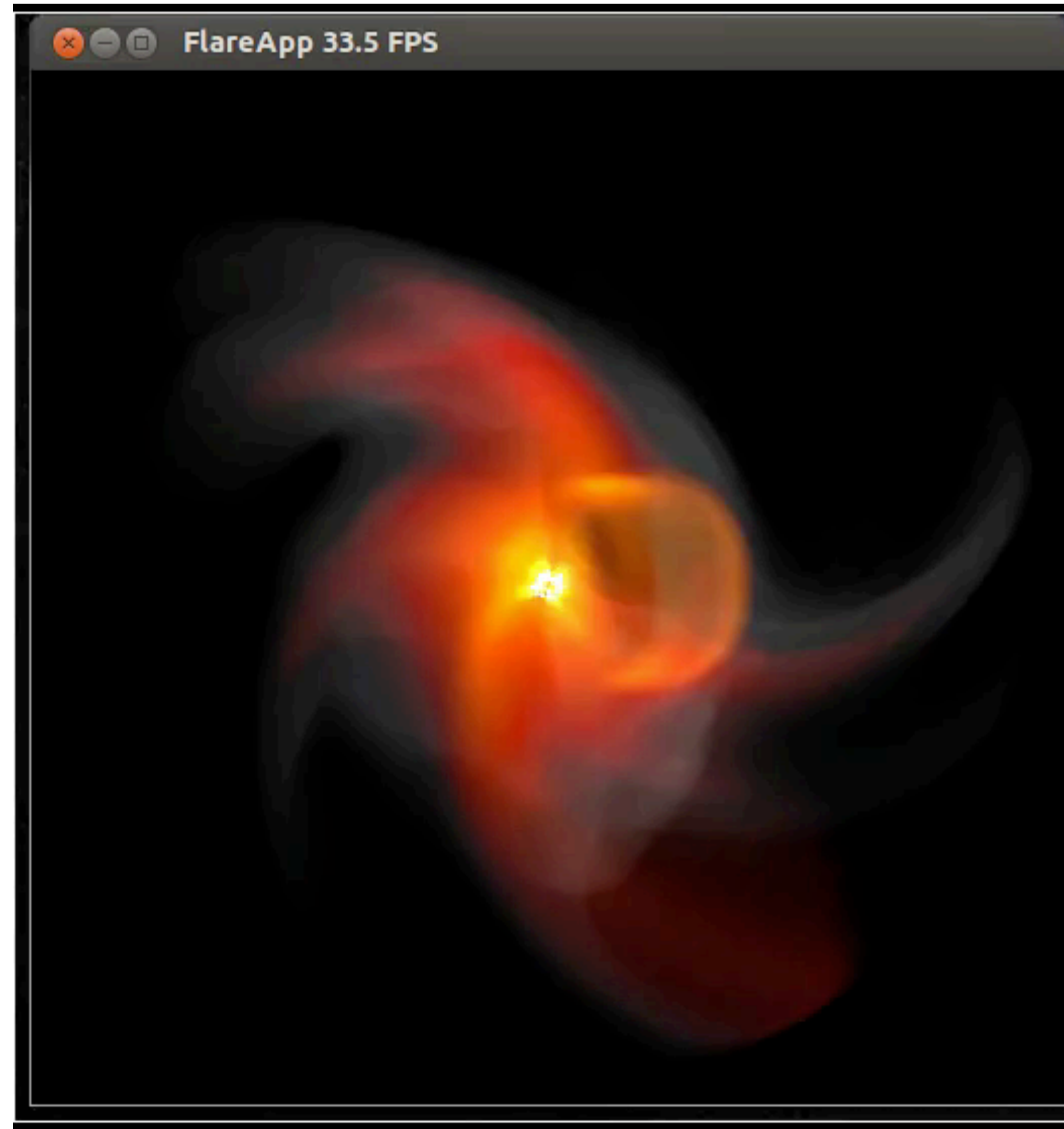
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\Rightarrow Upload parts of the image that have changed, cache the rest

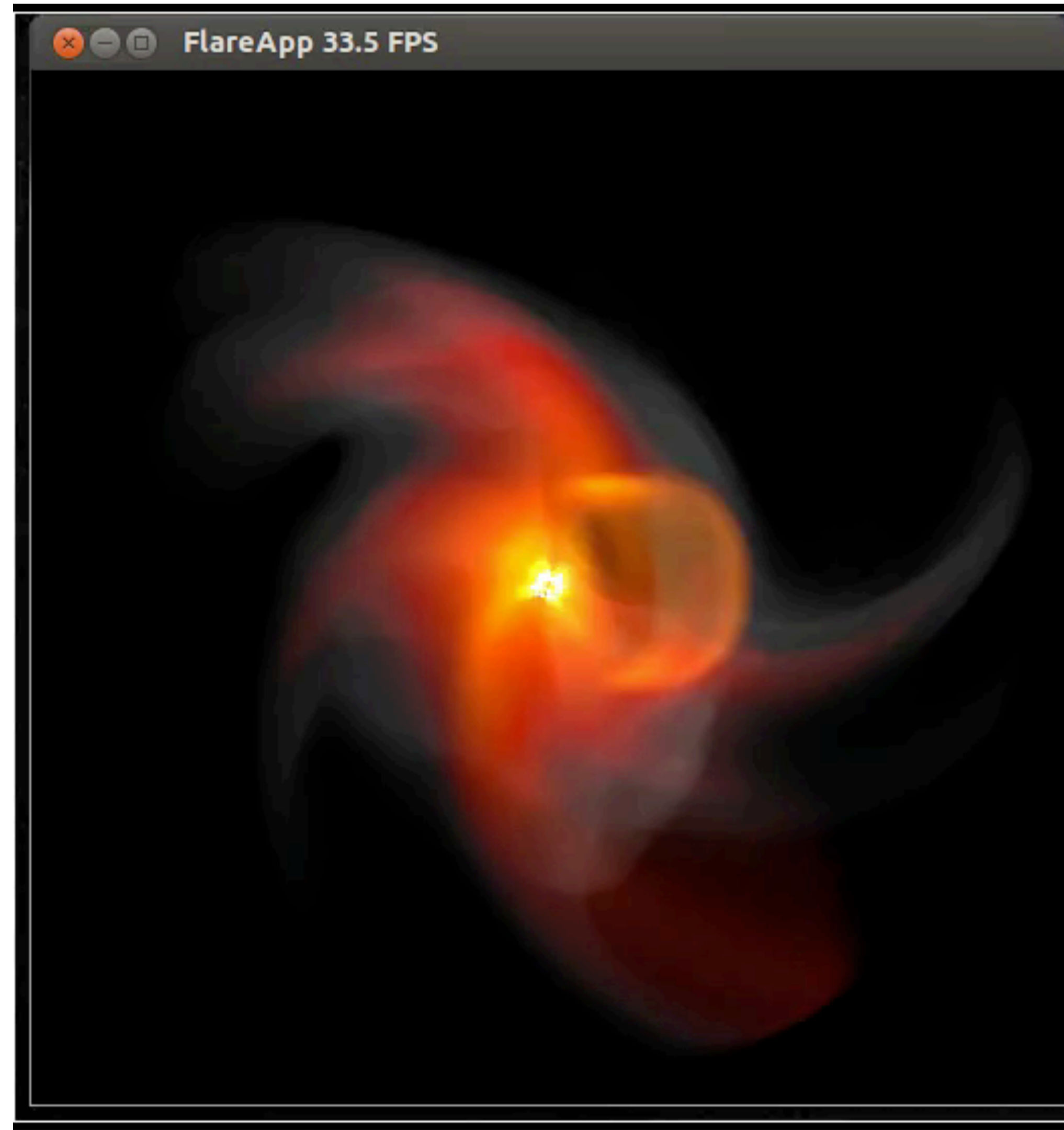
DYNAMIC VISUALIZATION OF SPACE WEATHER DATA

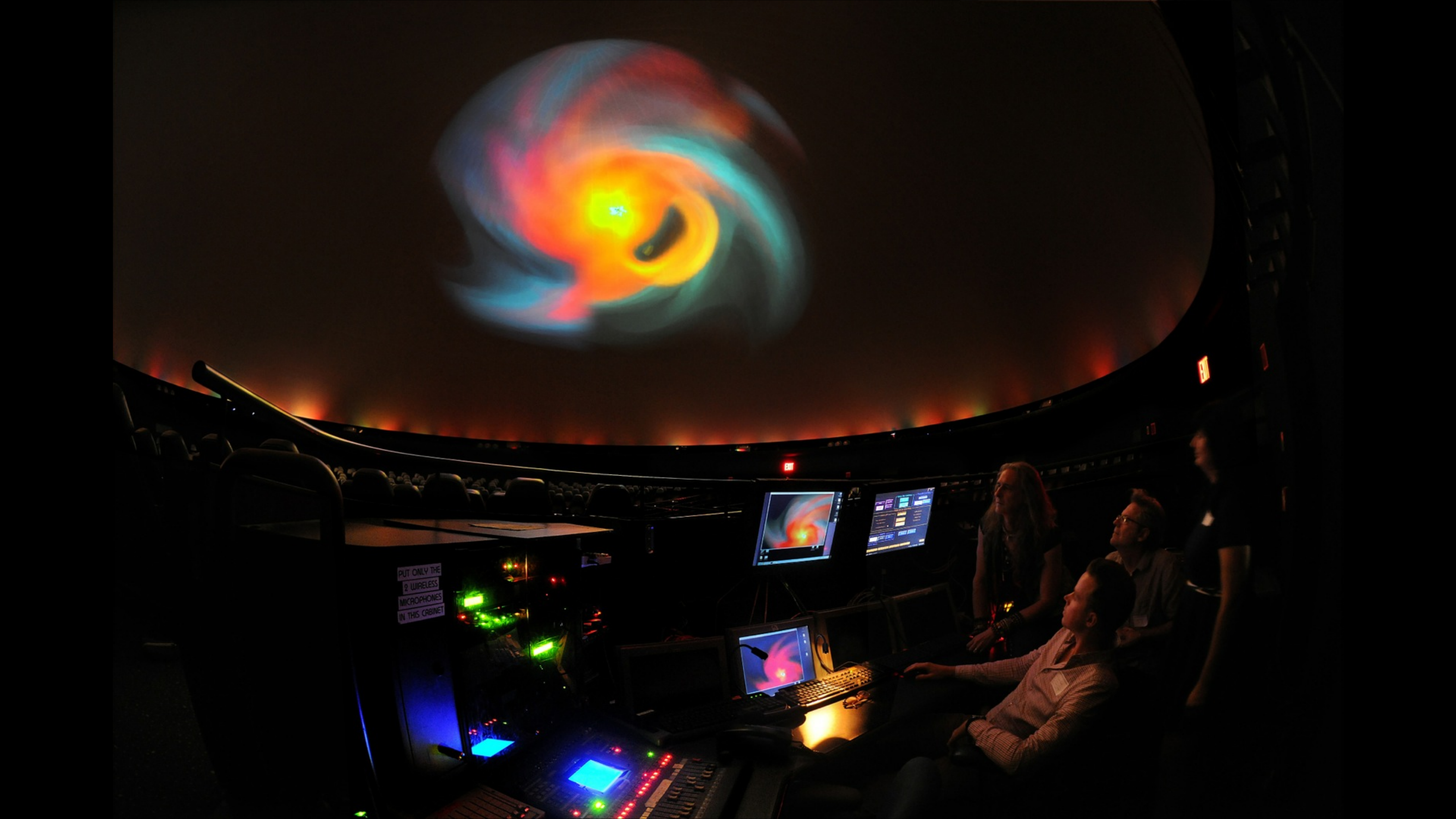


DYNAMIC VISUALIZATION OF SPACE WEATHER DATA



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VICTOR SAND

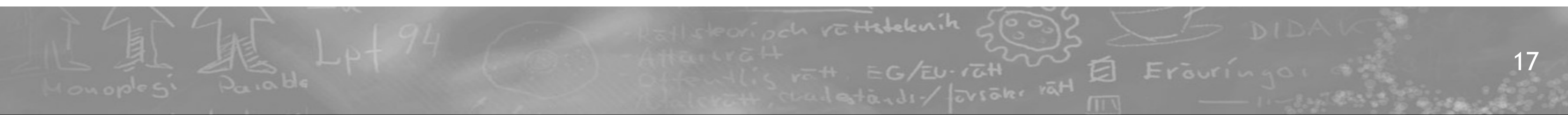
MJUKVARUUTVECKLARE, GOO TECHNOLOGIES



Civilingenjör Medieteknik

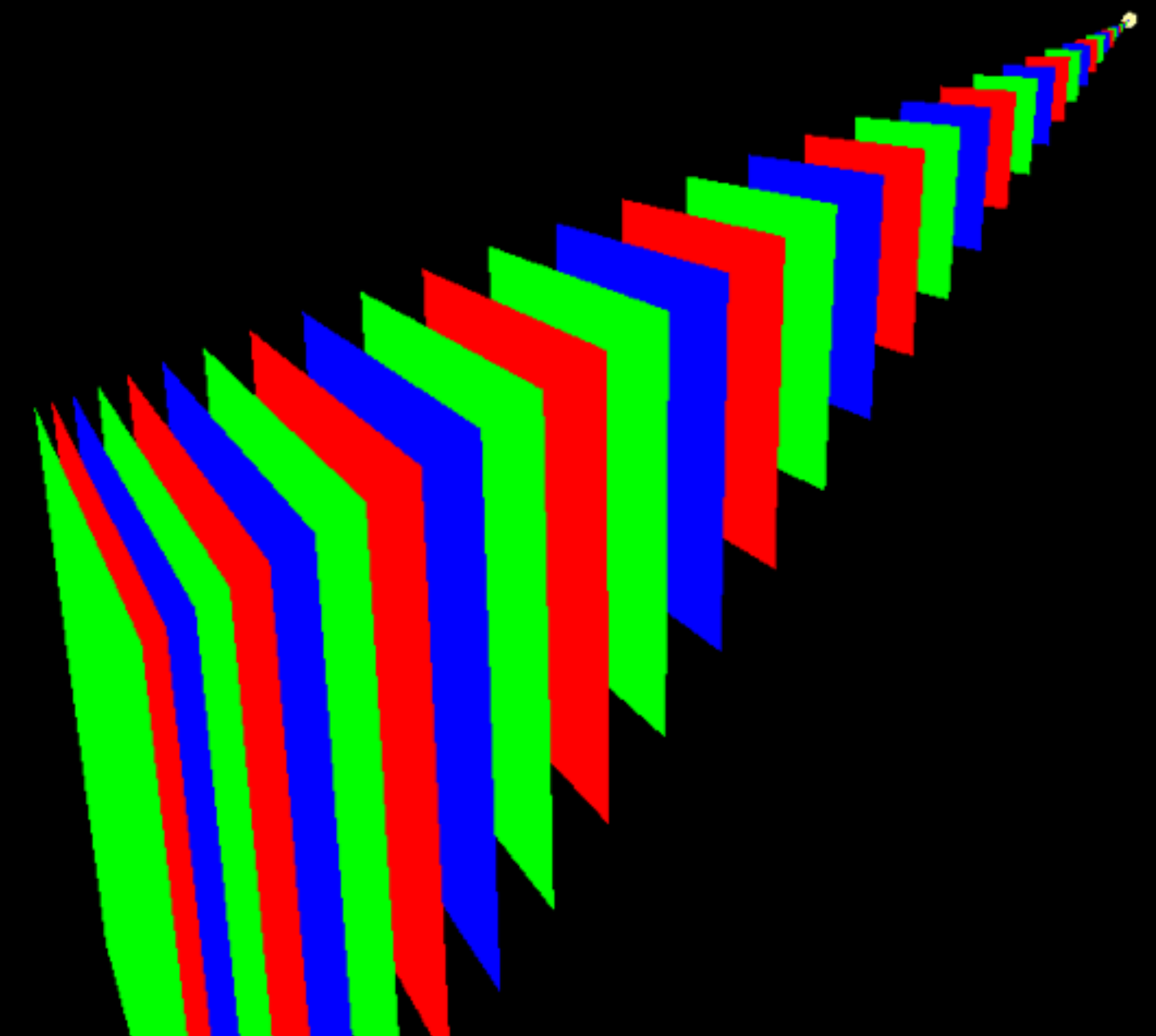
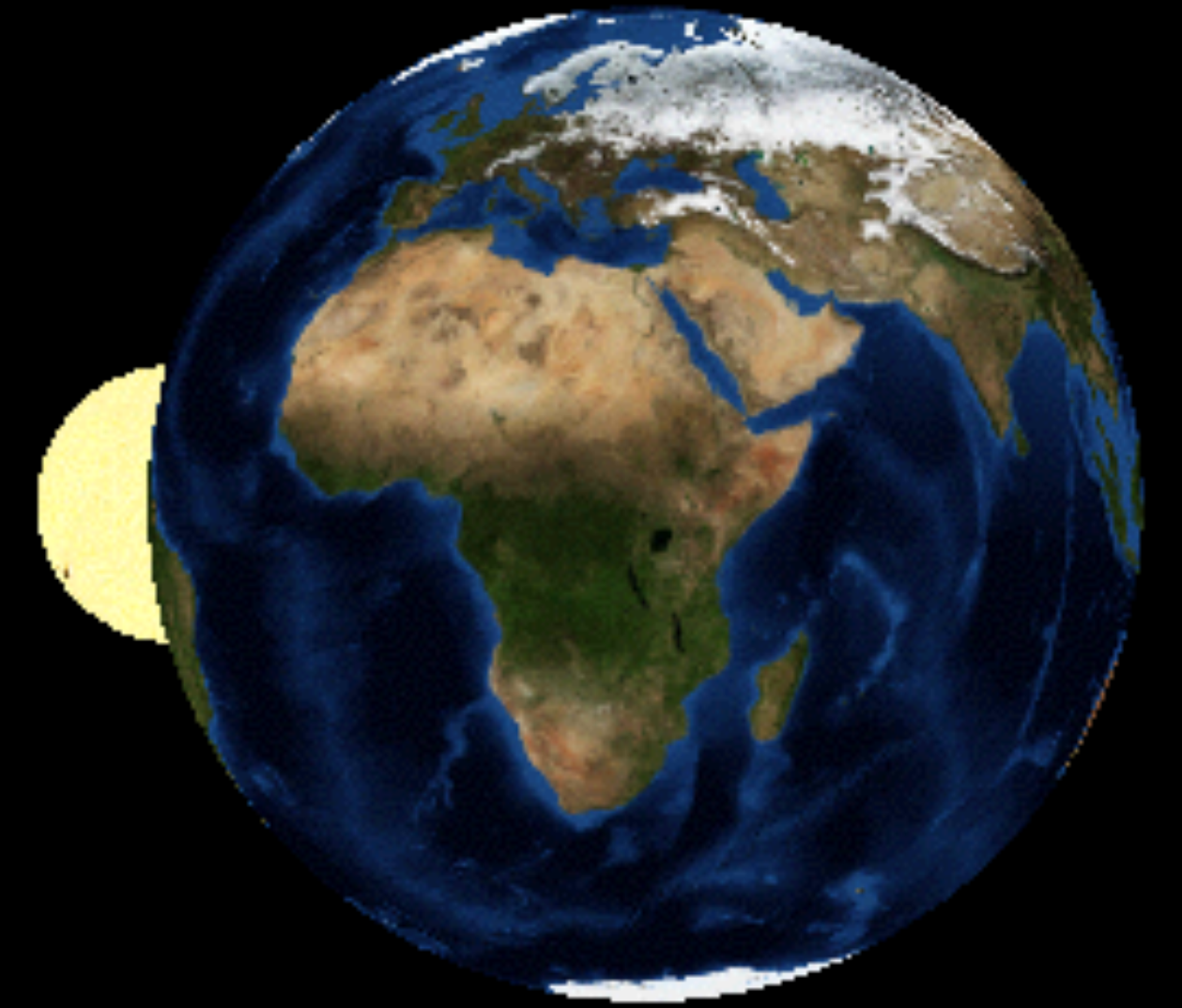
from **Linköping University** PLUS 2 weeks ago NOT YET RATED

WHAT IS...



OPENSOURCE

- Open Source (BSD-license) software to contextualize the Universe
- Multiscale rendering ($\approx 10^{-30}$ to $\approx 10^{30}$ m) in a single coordinate system
- Chi-Wing Fu and Andrew J. Hanson, *A Transparently Scalable Visualization Architecture for Exploring the Universe*, TVCG 2007
- Replace $(x,y,z) = (x',y',z',e)$ where $\{x,y,z\}' * 10^e = \{x,y,z\}$ to reduce the problem of IEEE 754 float precision
- Order-independent transparency
- Extensibility for new rendering algorithms and modalities



HANS-CHRISTIAN HELLTEGEN



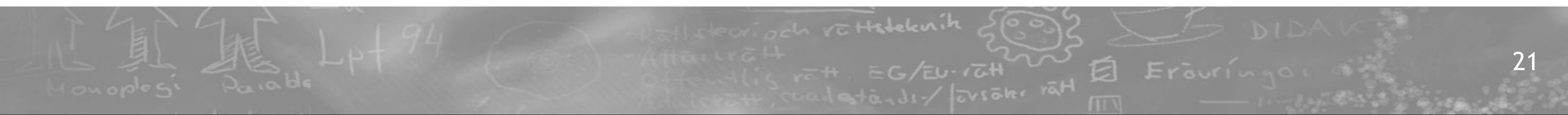
Multimodel-aware spatio-temporal interpolation

JONAS STRANDSTEDT

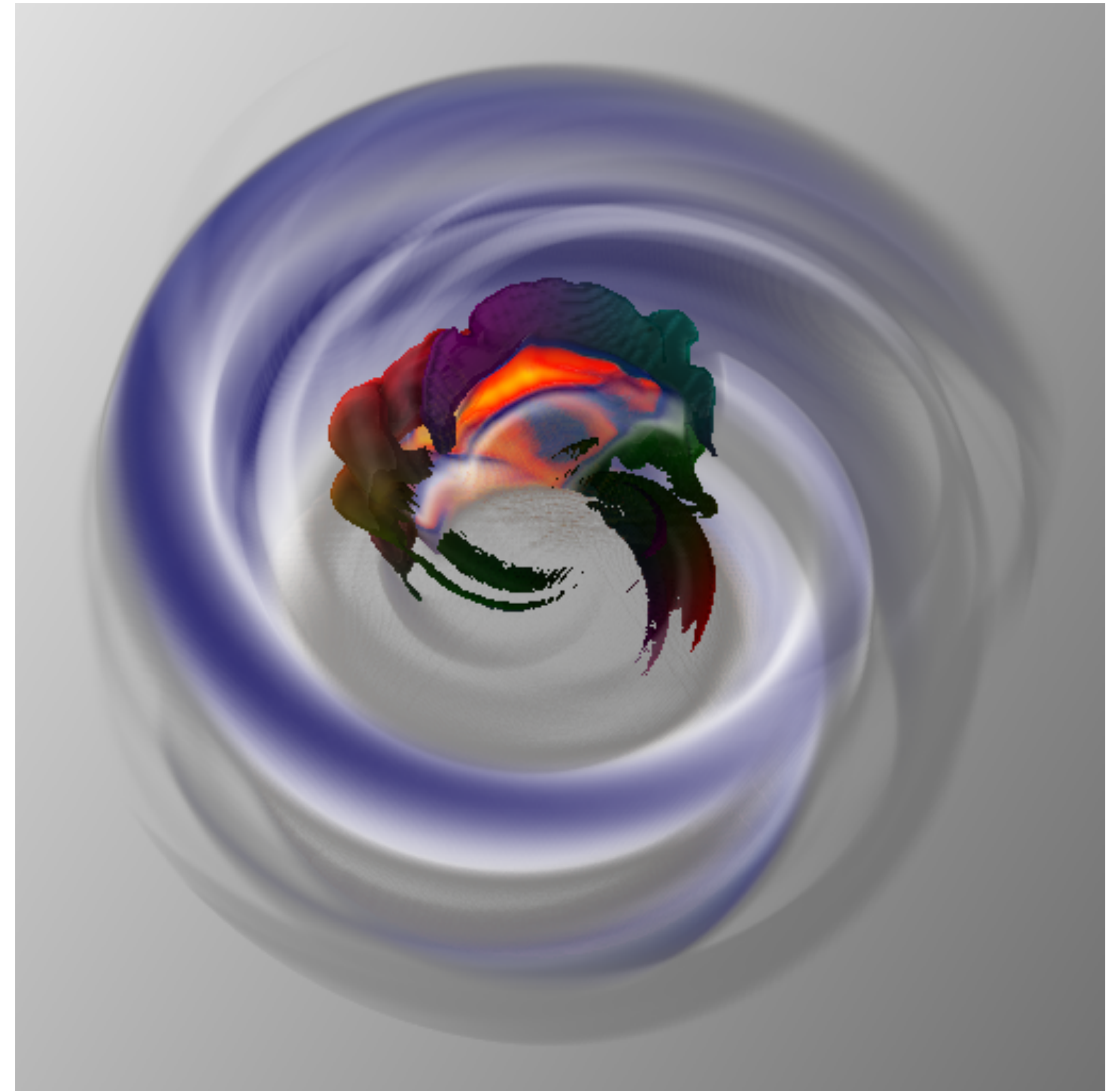
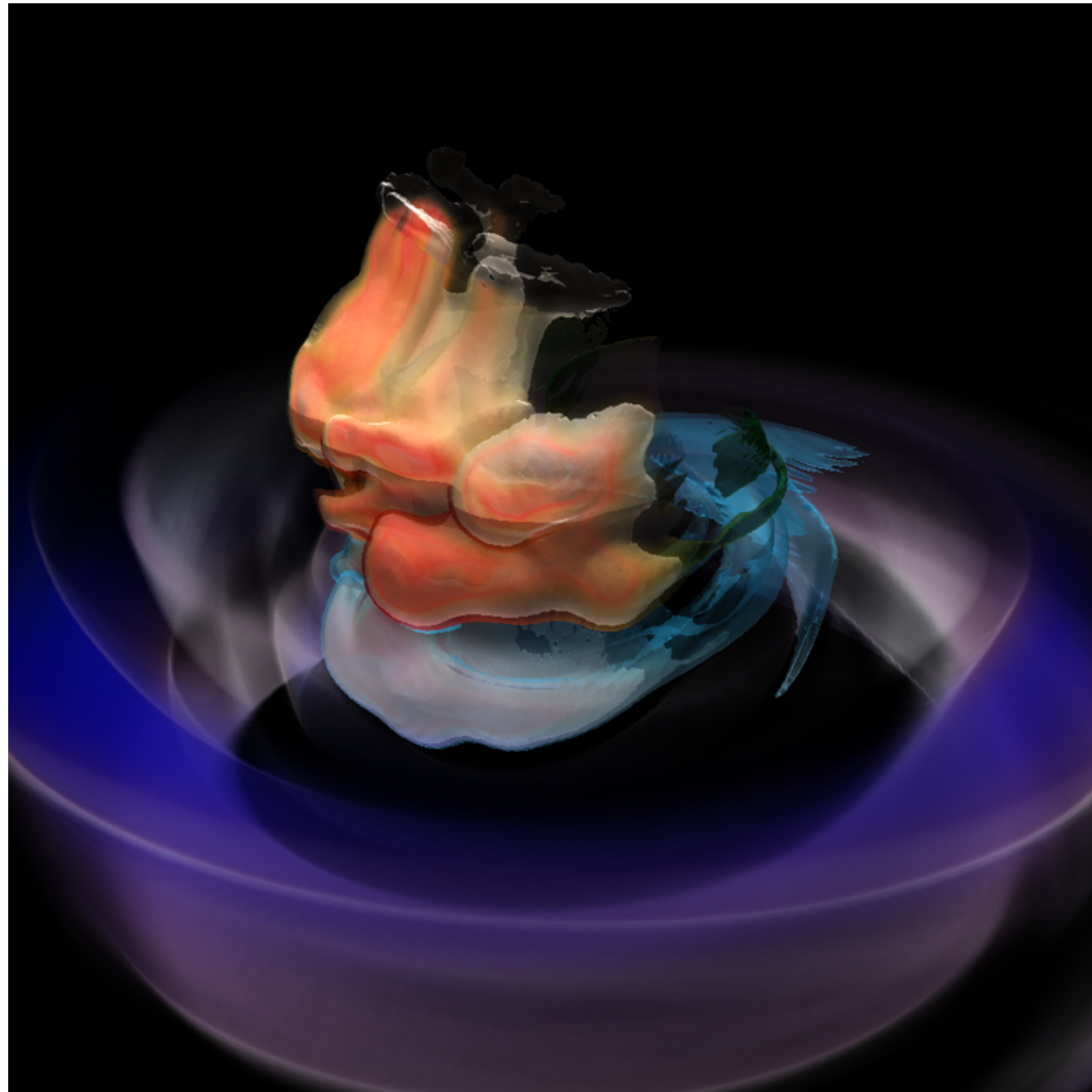


*Efficient multi-variate classification
of Coronal Mass Ejection events in ENLIL simulations*

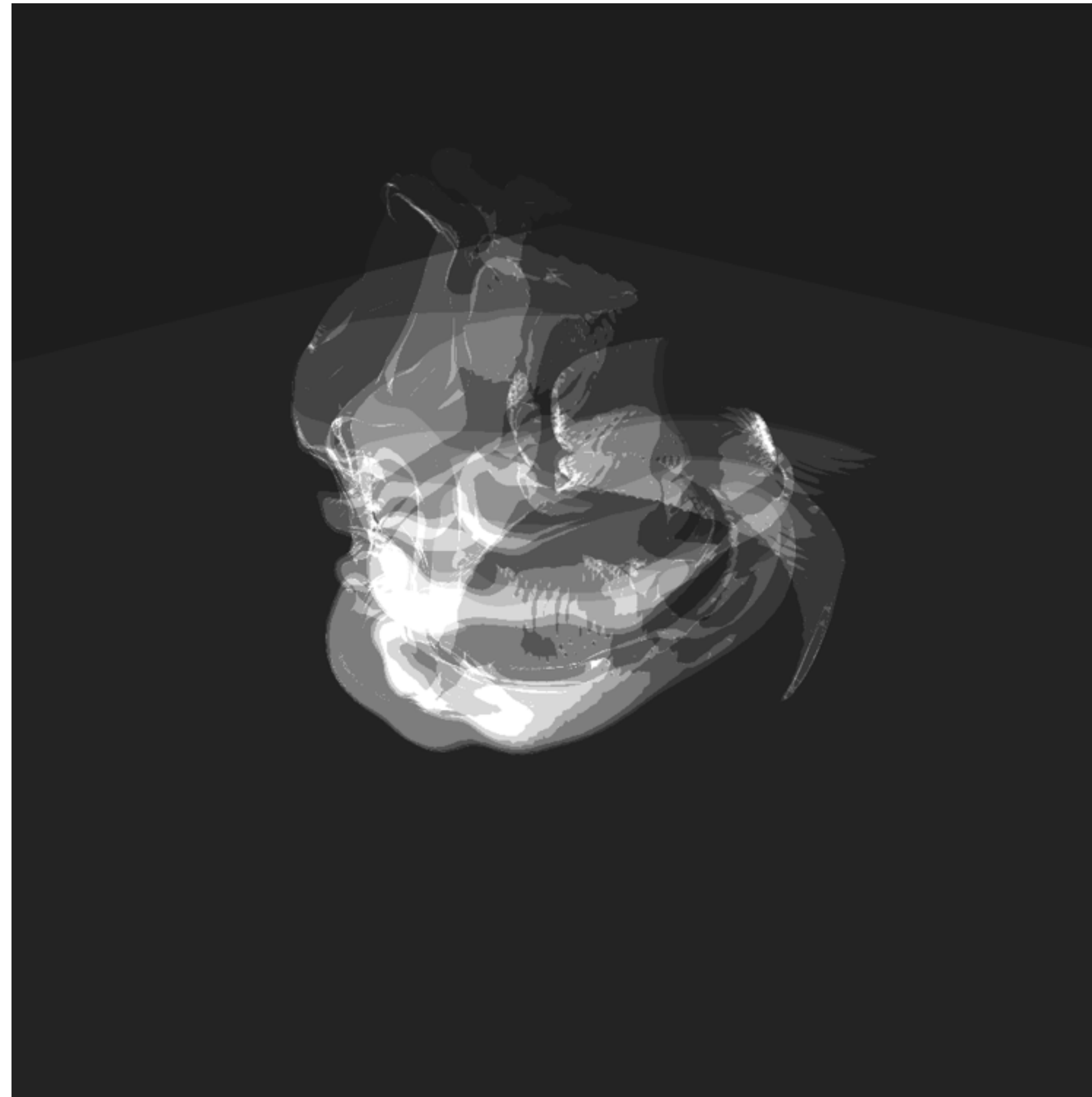
VOLUME FUSION



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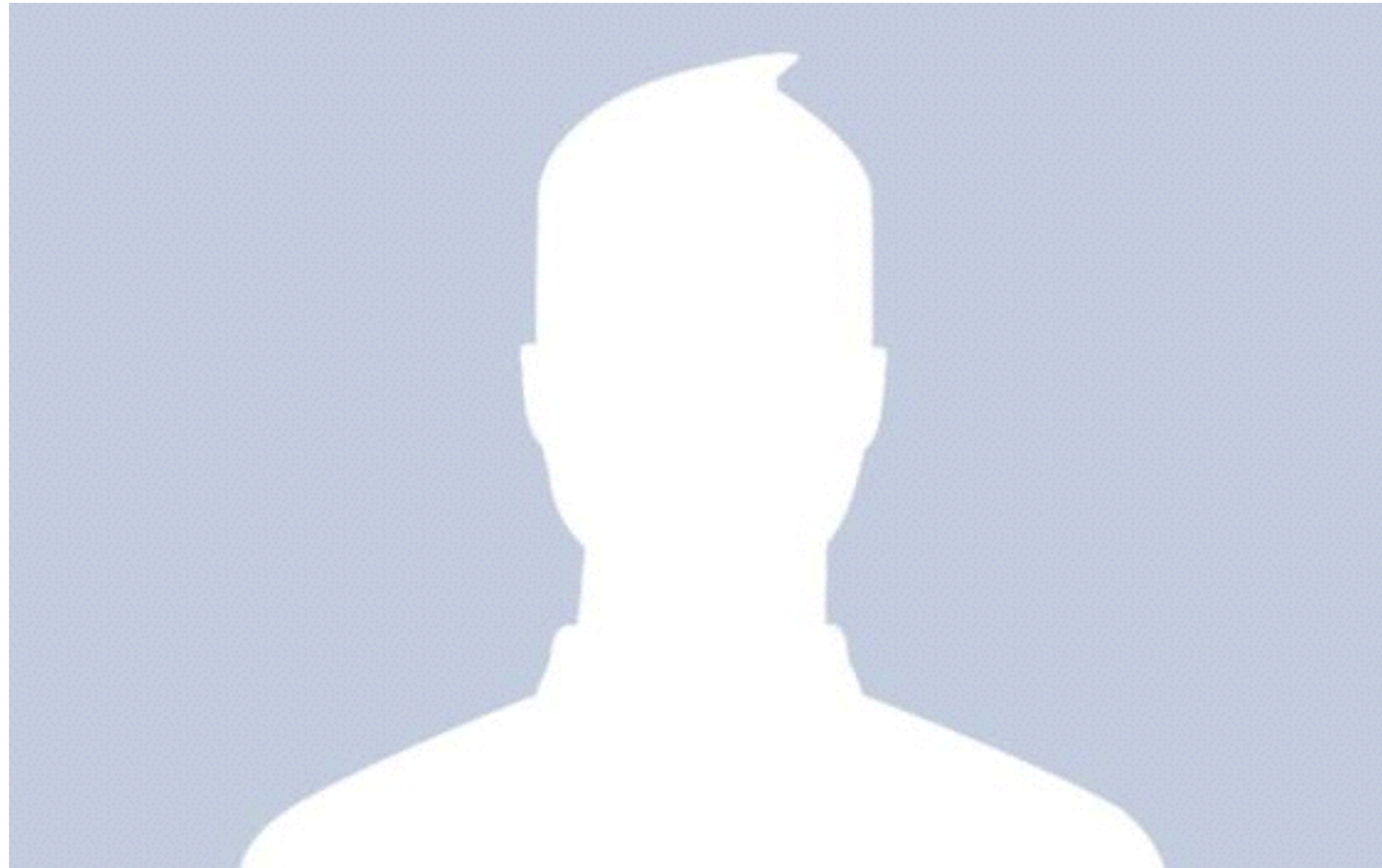


VOLUME FUSION

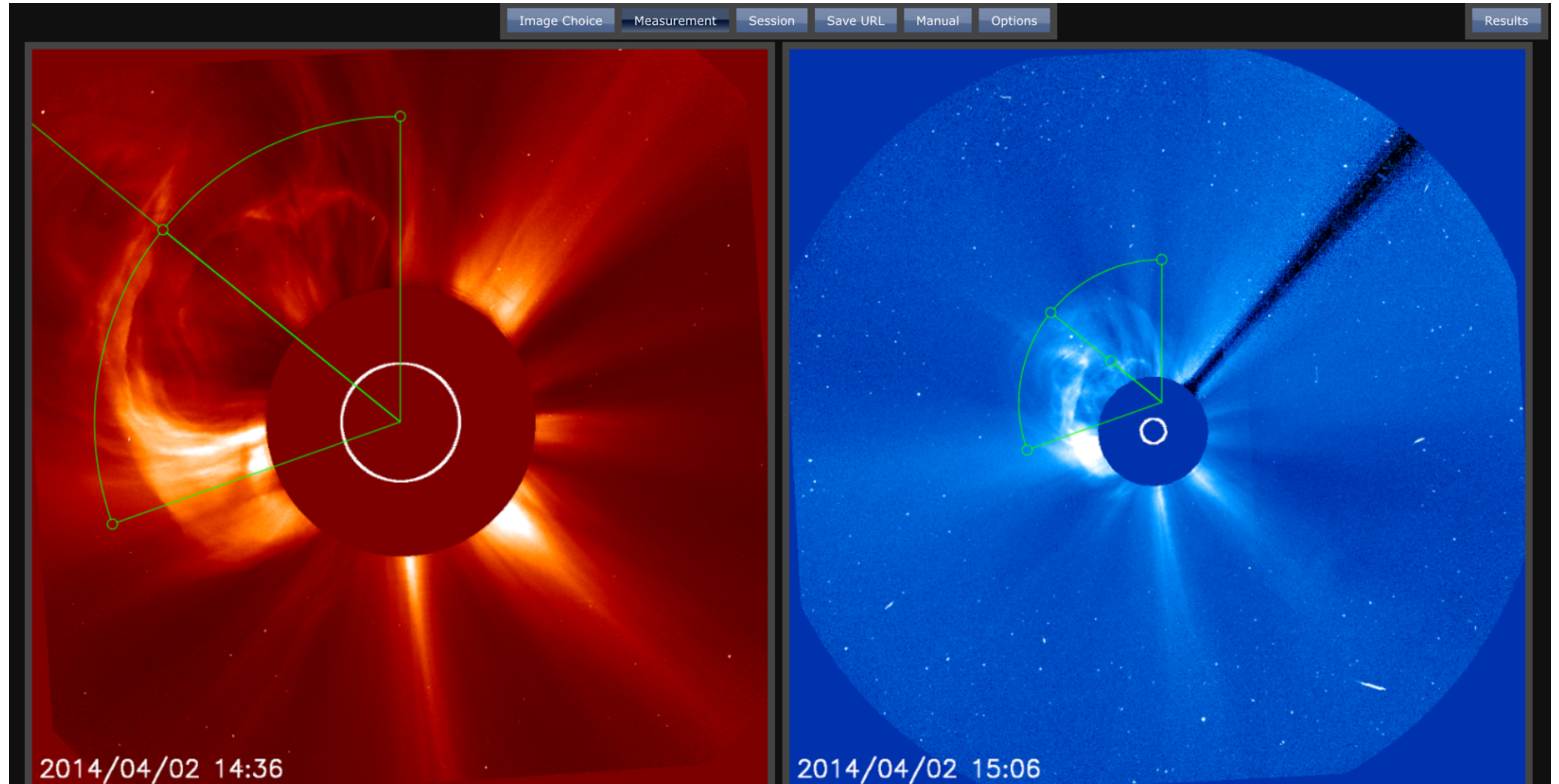


WHAT WILL BE...

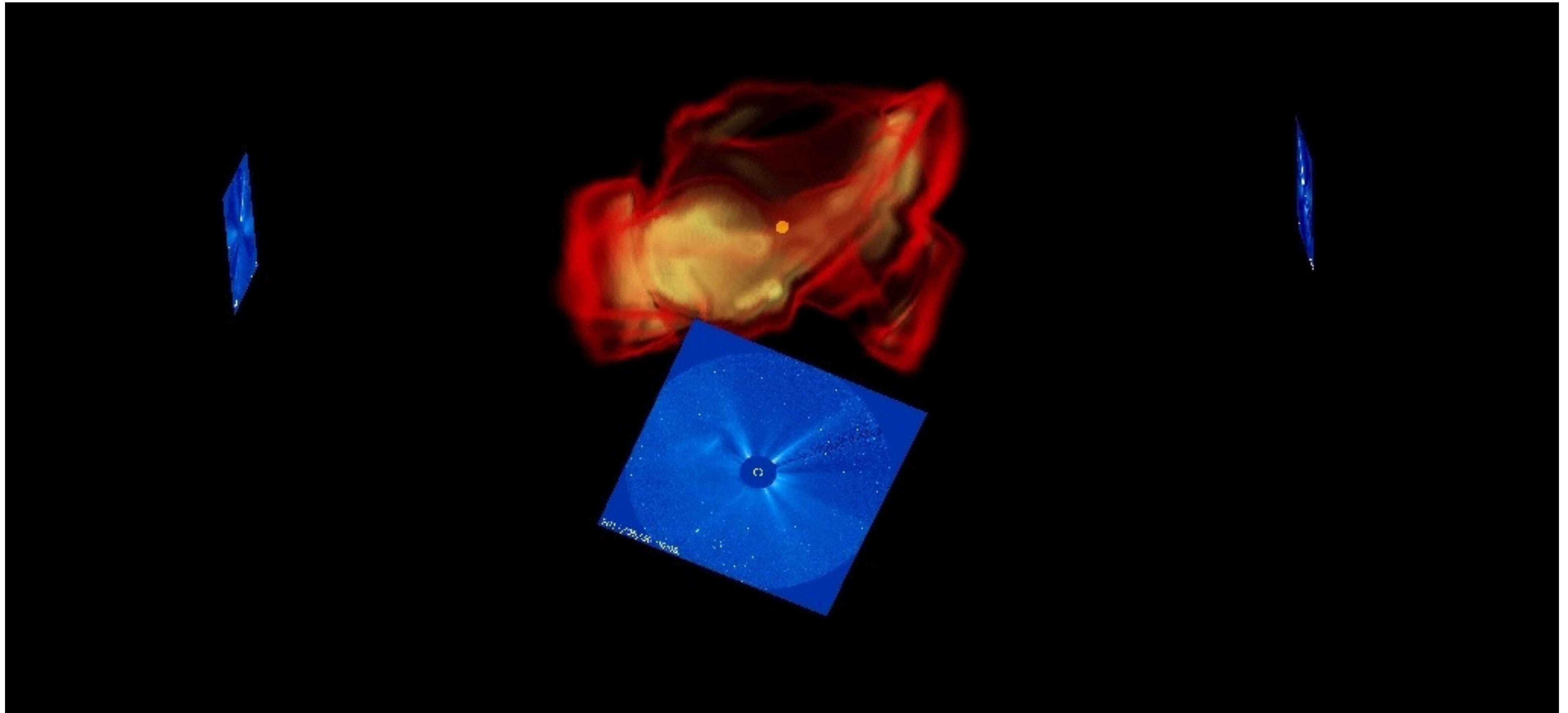
MASTER THESES?



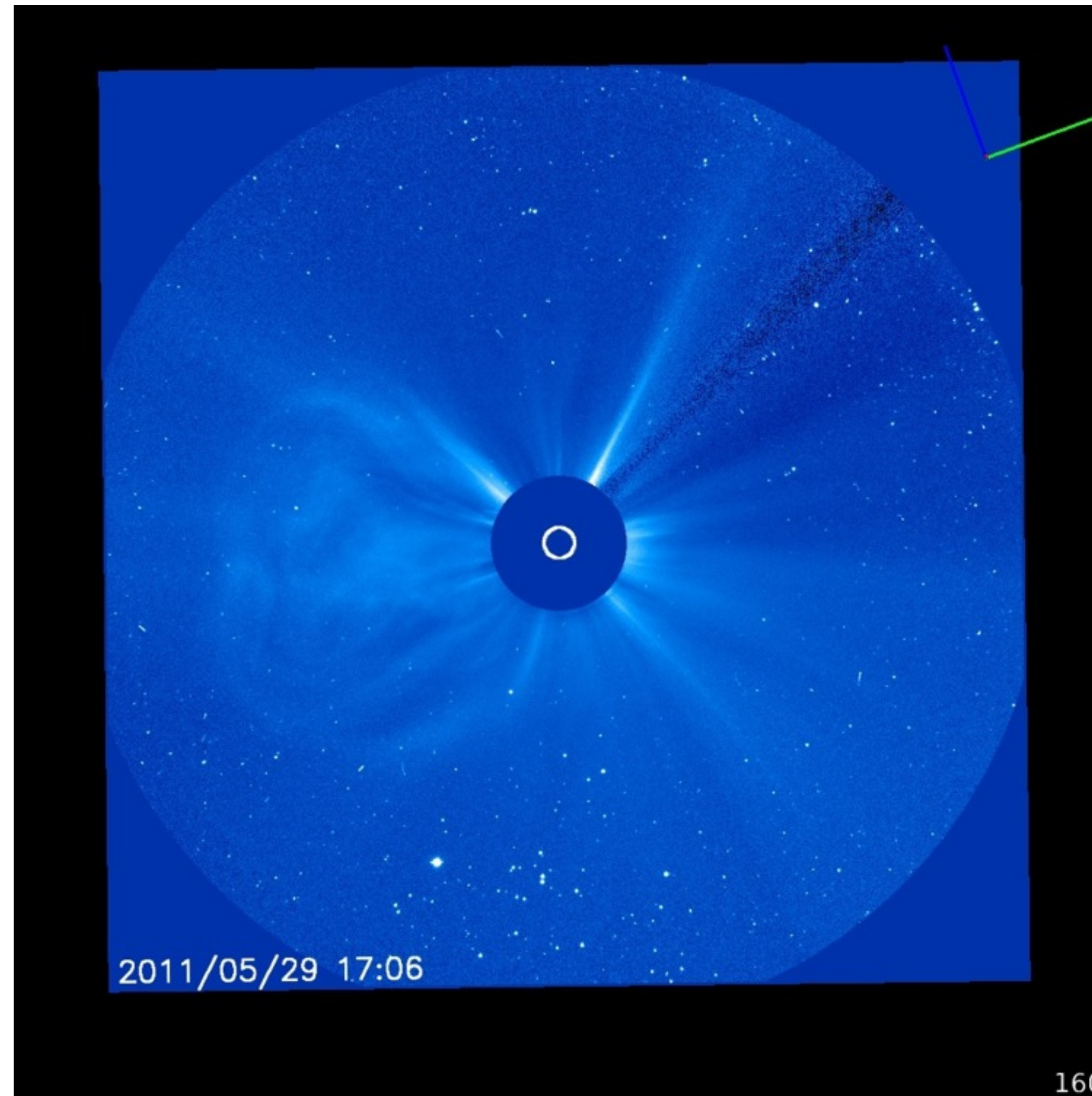
VISUAL VERIFICATION OF SIMULATION RESULTS



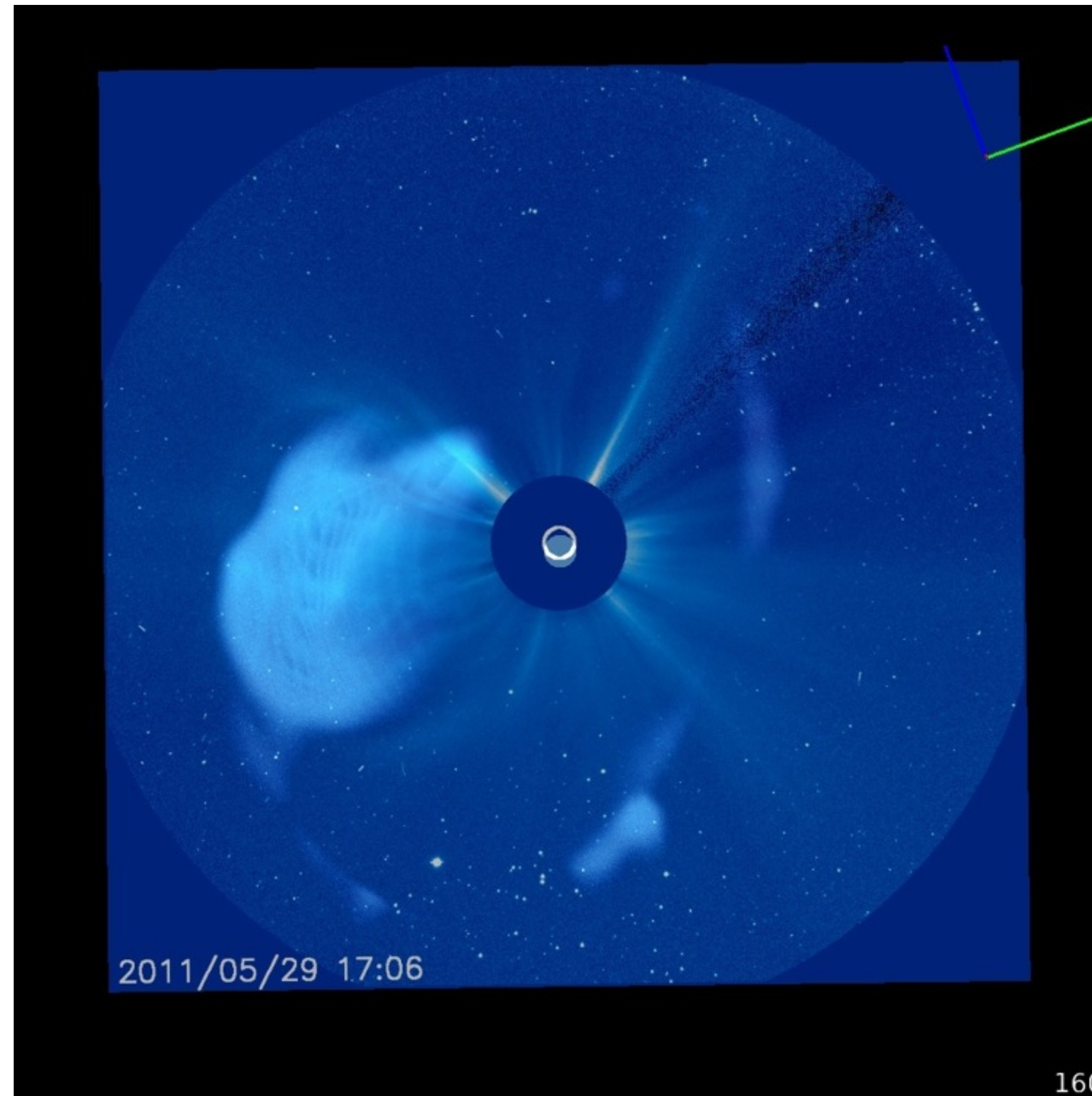
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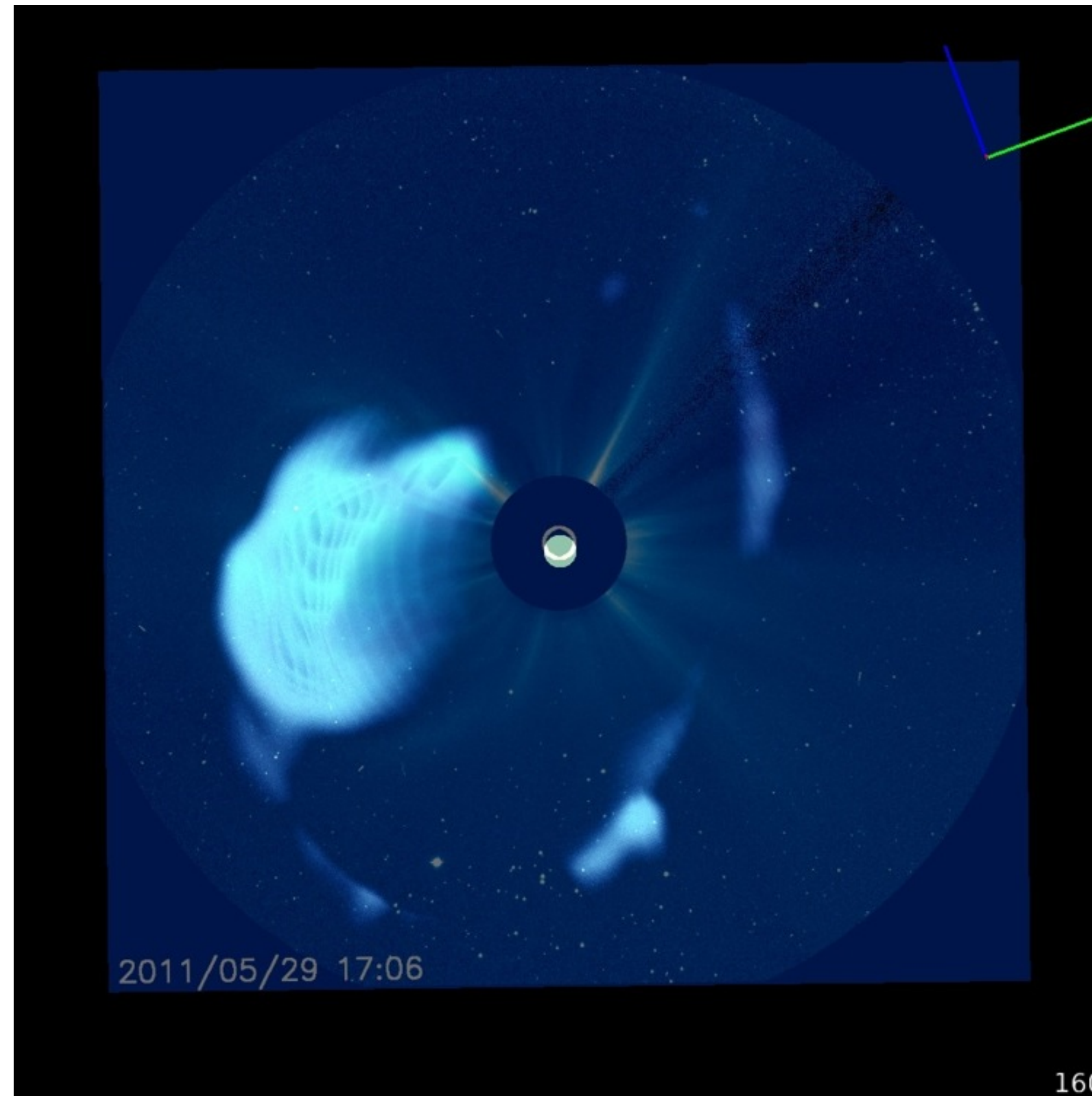
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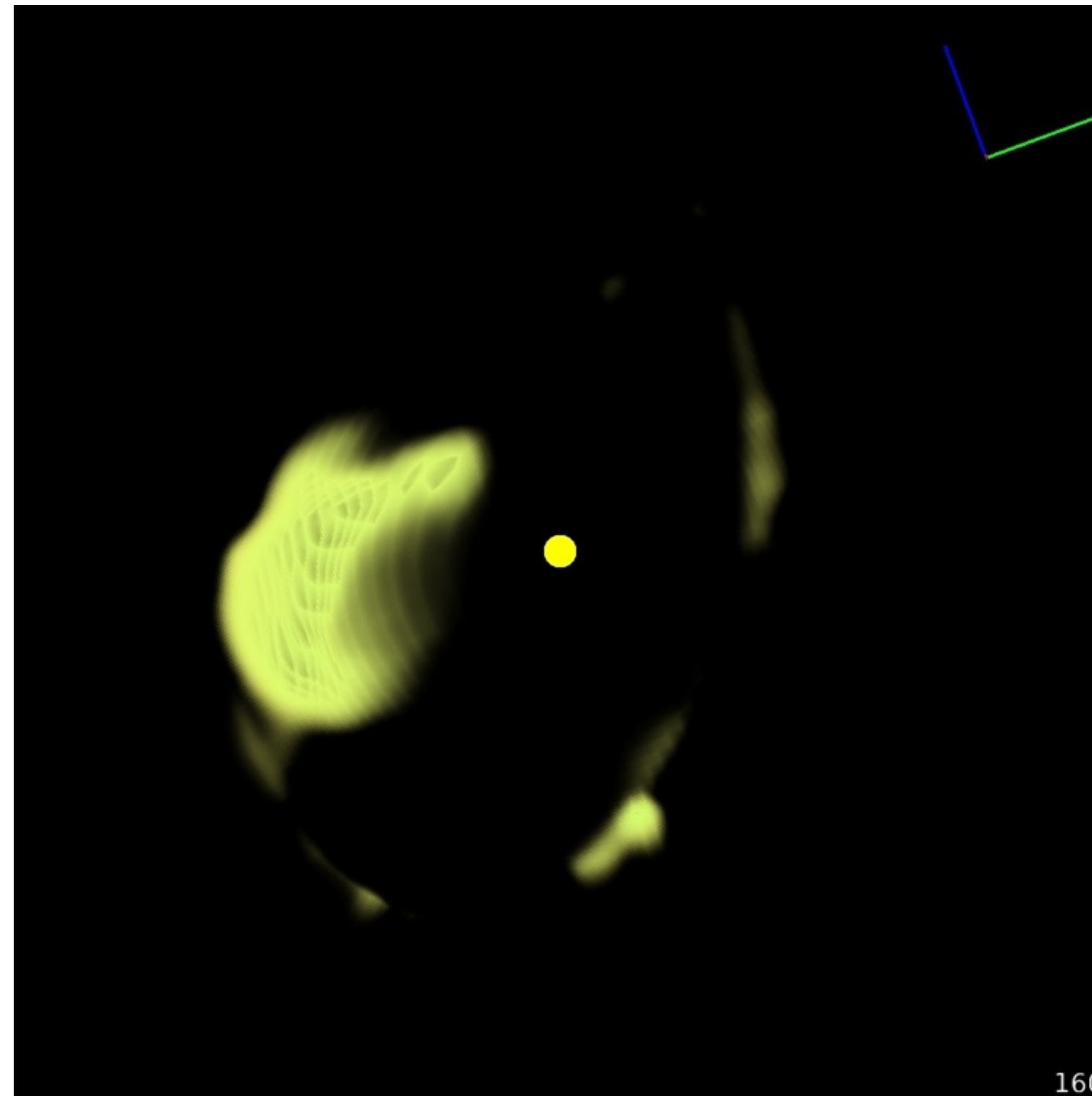
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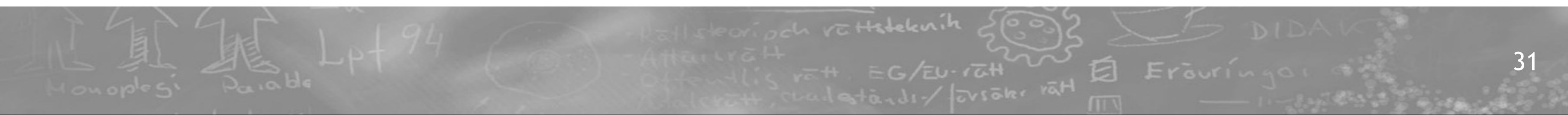


VISUAL VERIFICATION OF SIMULATION RESULTS



160

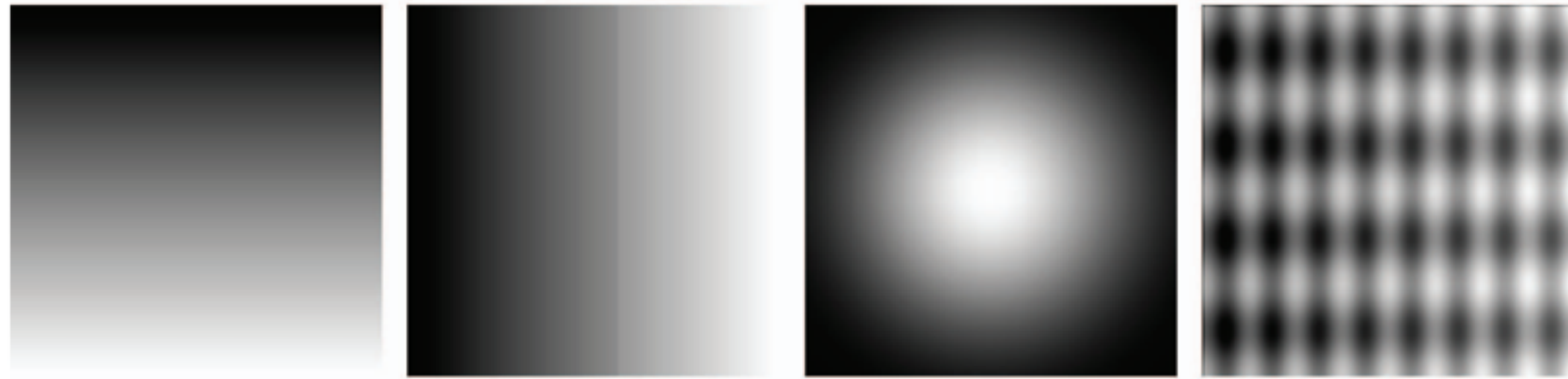
RAINBOW COLOR MAPS



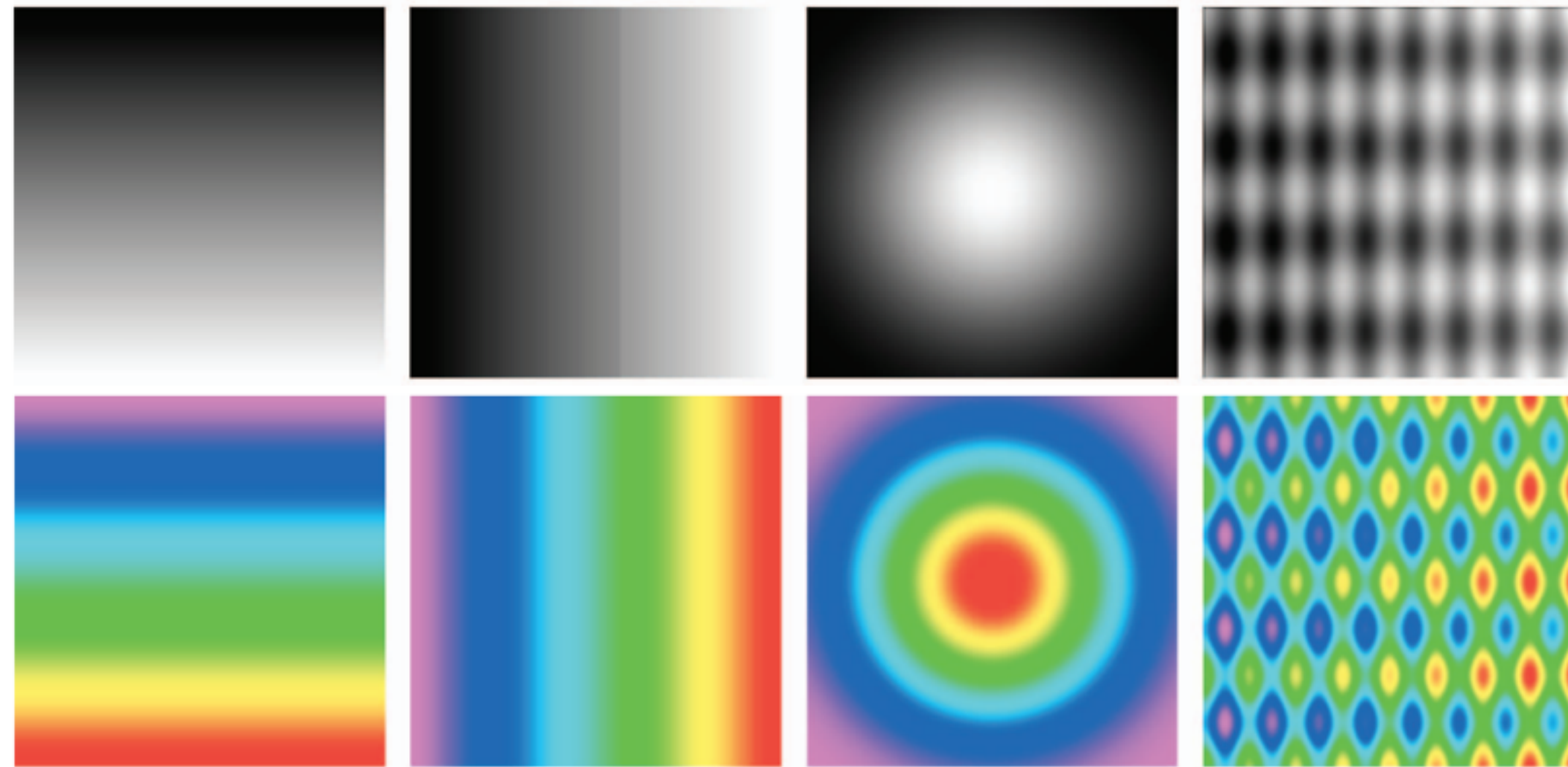
RAINBOW COLOR MAPS

- Coline Ware, “Color sequences for univariate maps: Theory, experiments and principles”, IEEE Computer Graphics and Applications, 1988.
- B. E. Rogowitz, L. A. Treinish, and S. Bryson, “How not to lie with visualization,” Computers in Physics, vol. 10, no. 3, pp. 268–273, 1996.
- D. Borland and R. M. Taylor, “Rainbow Color Map (Still) Considered Harmful,” IEEE Computer Graphics and Applications, vol. 27, no. 2, pp. 14-17, Apr. 2007.
- <http://mycarta.wordpress.com/2012/05/12/the-rainbow-is-dead-long-live-the-rainbow>

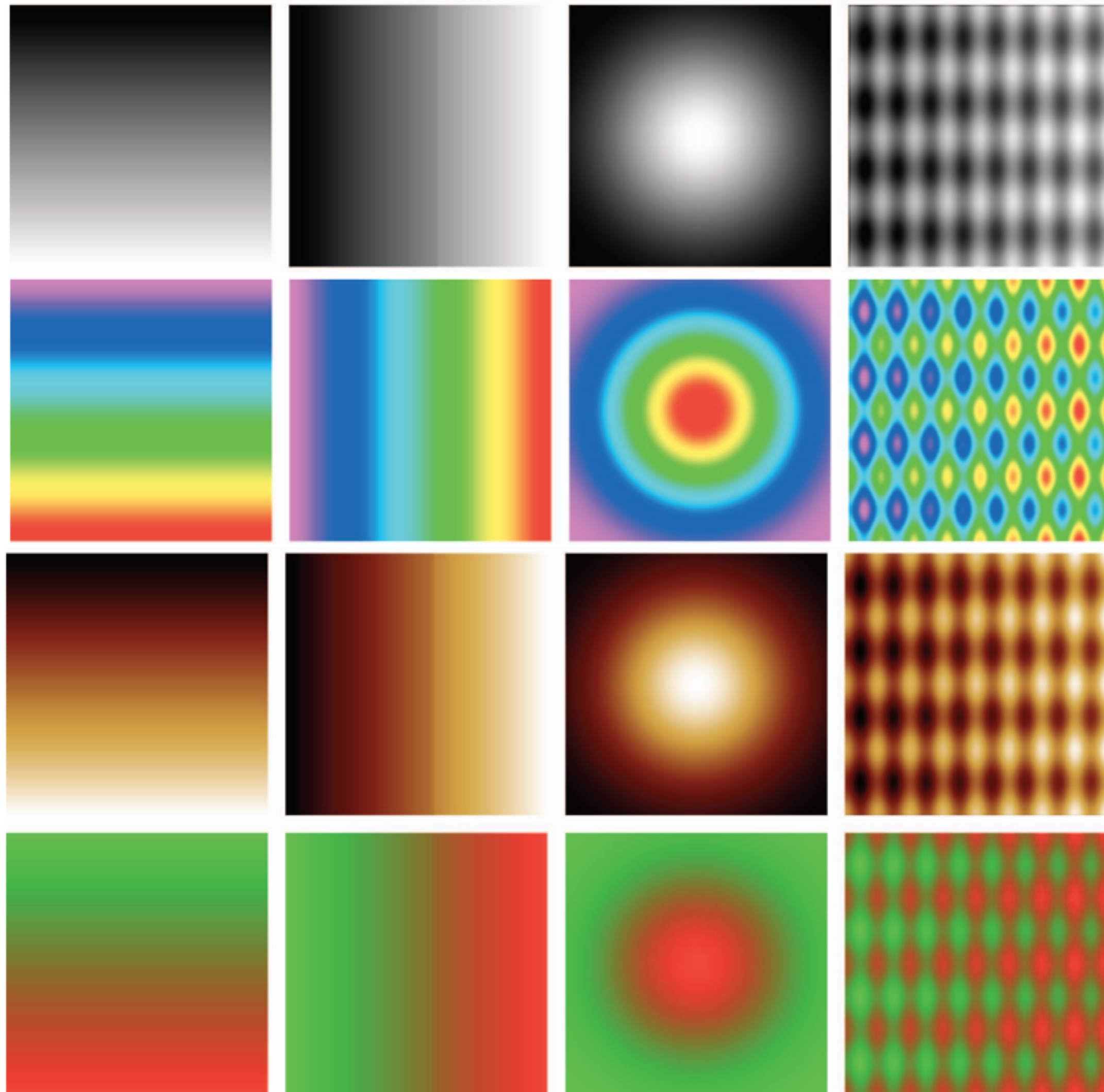
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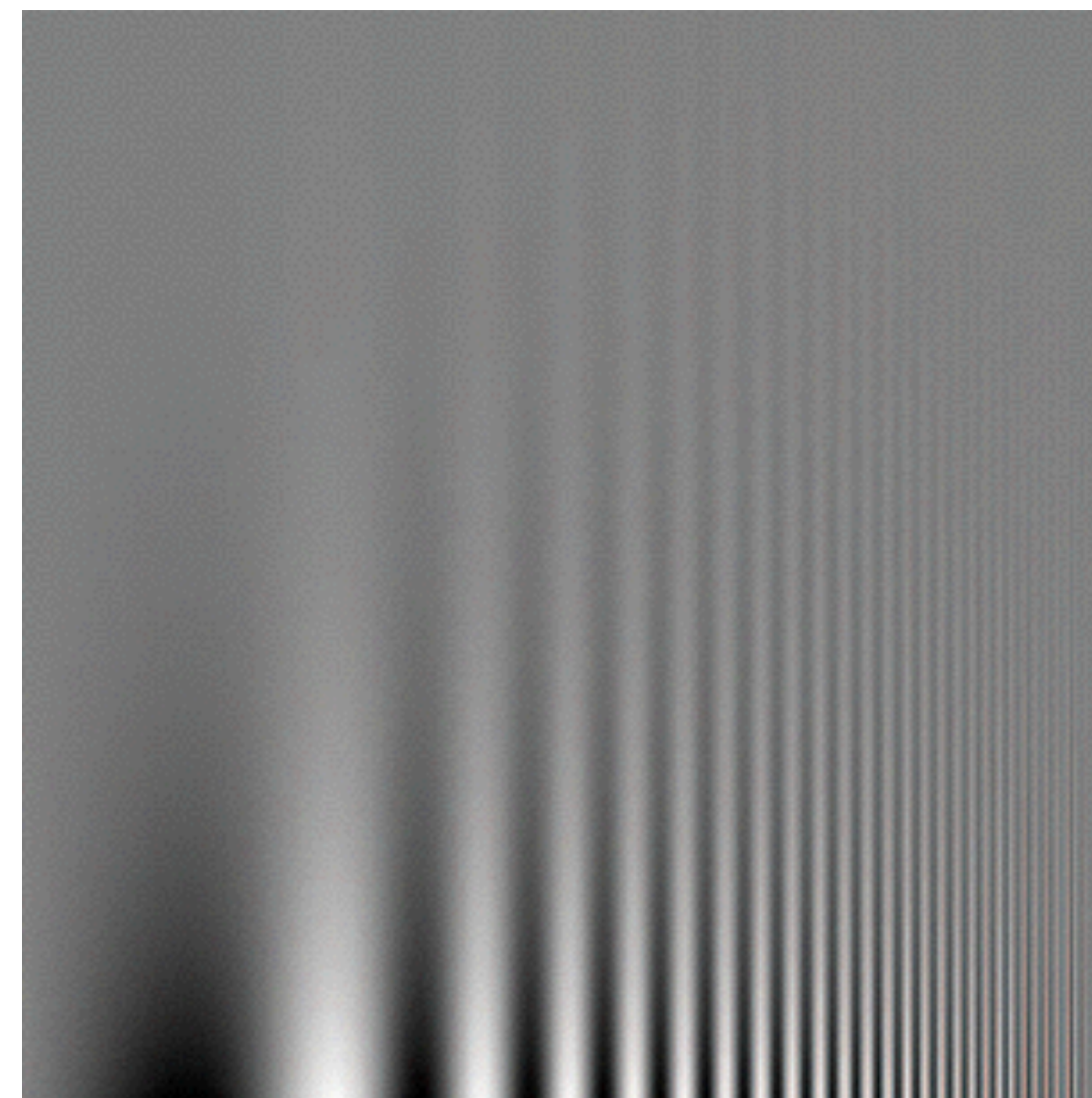
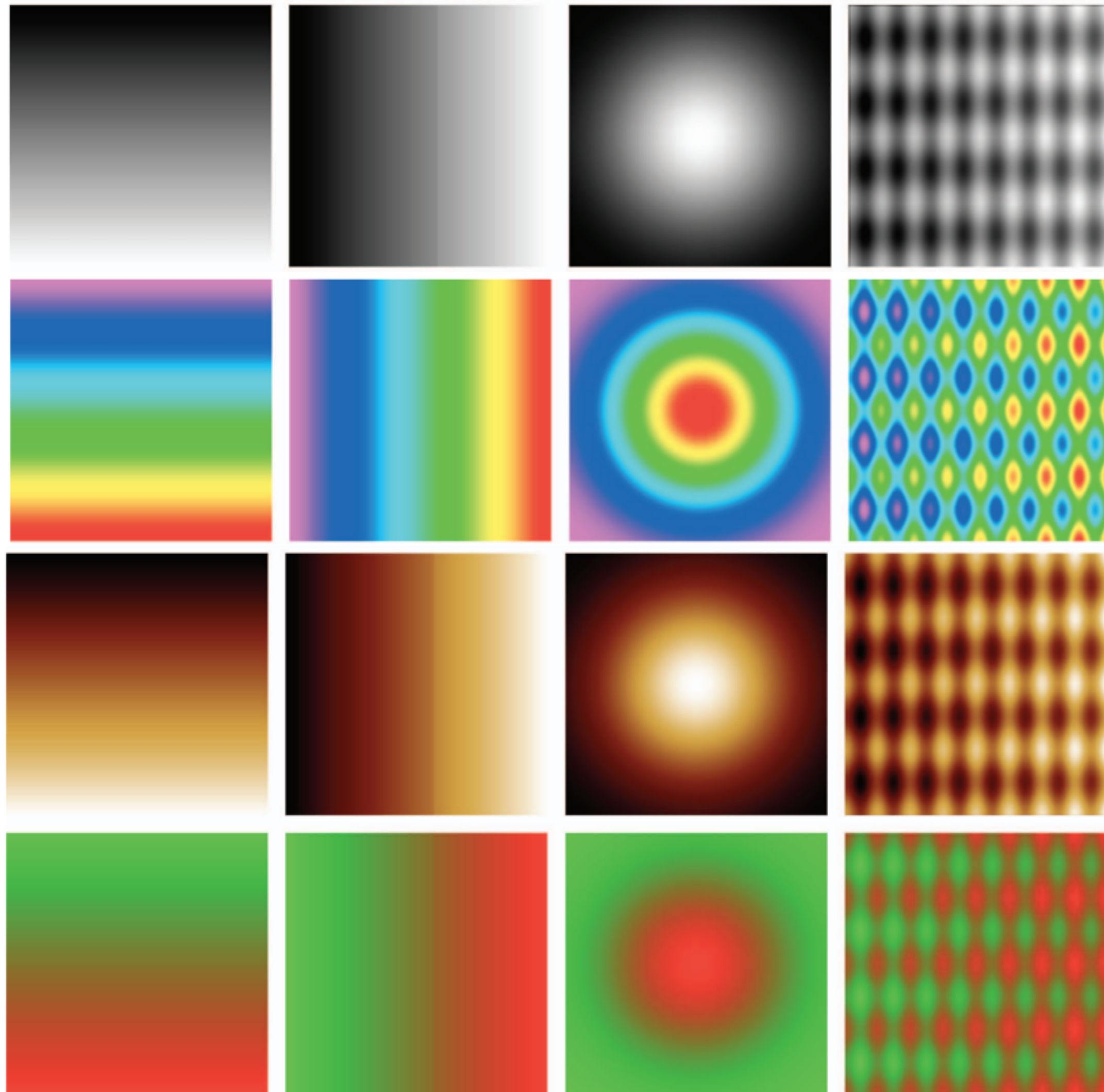
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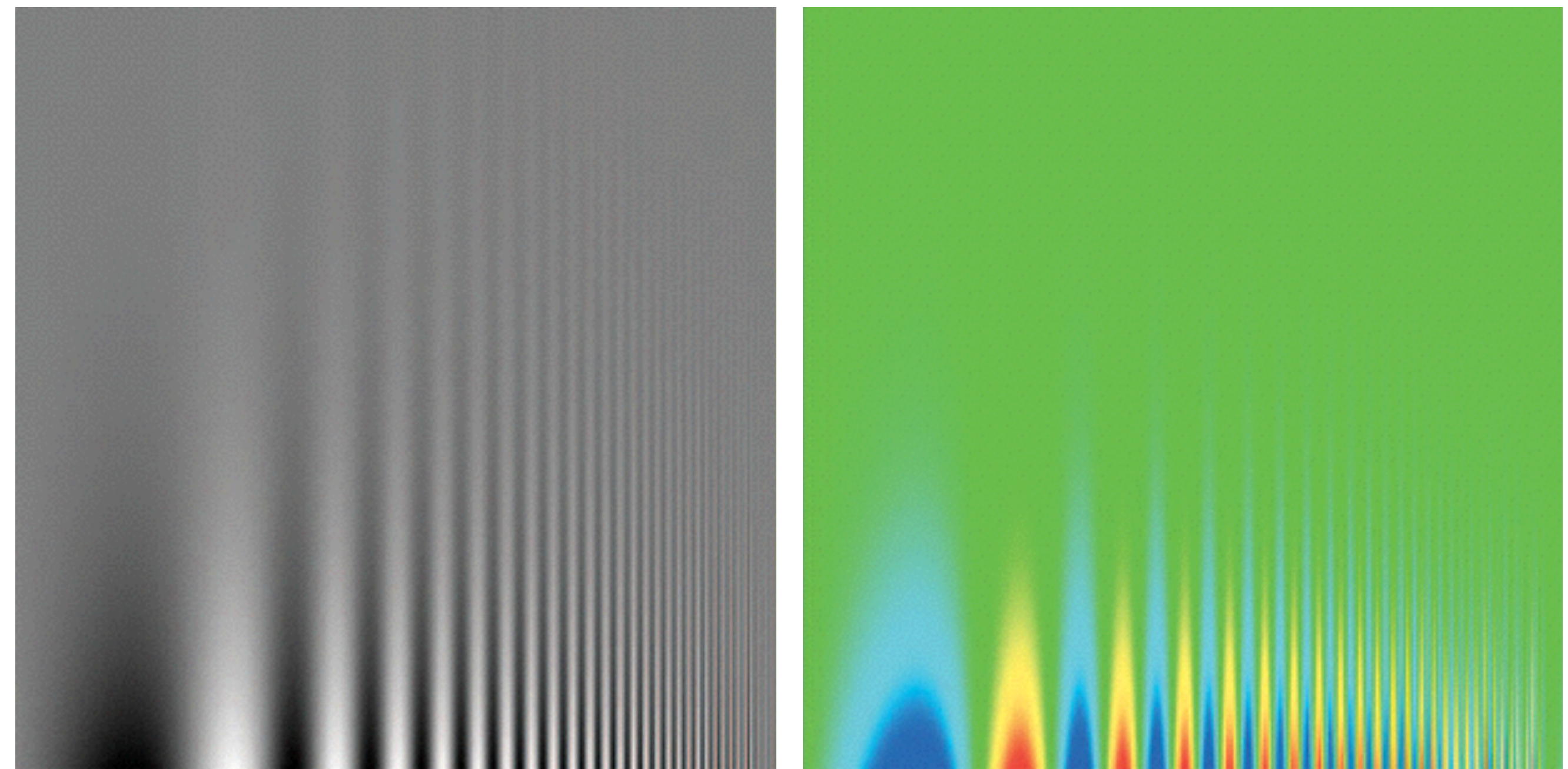
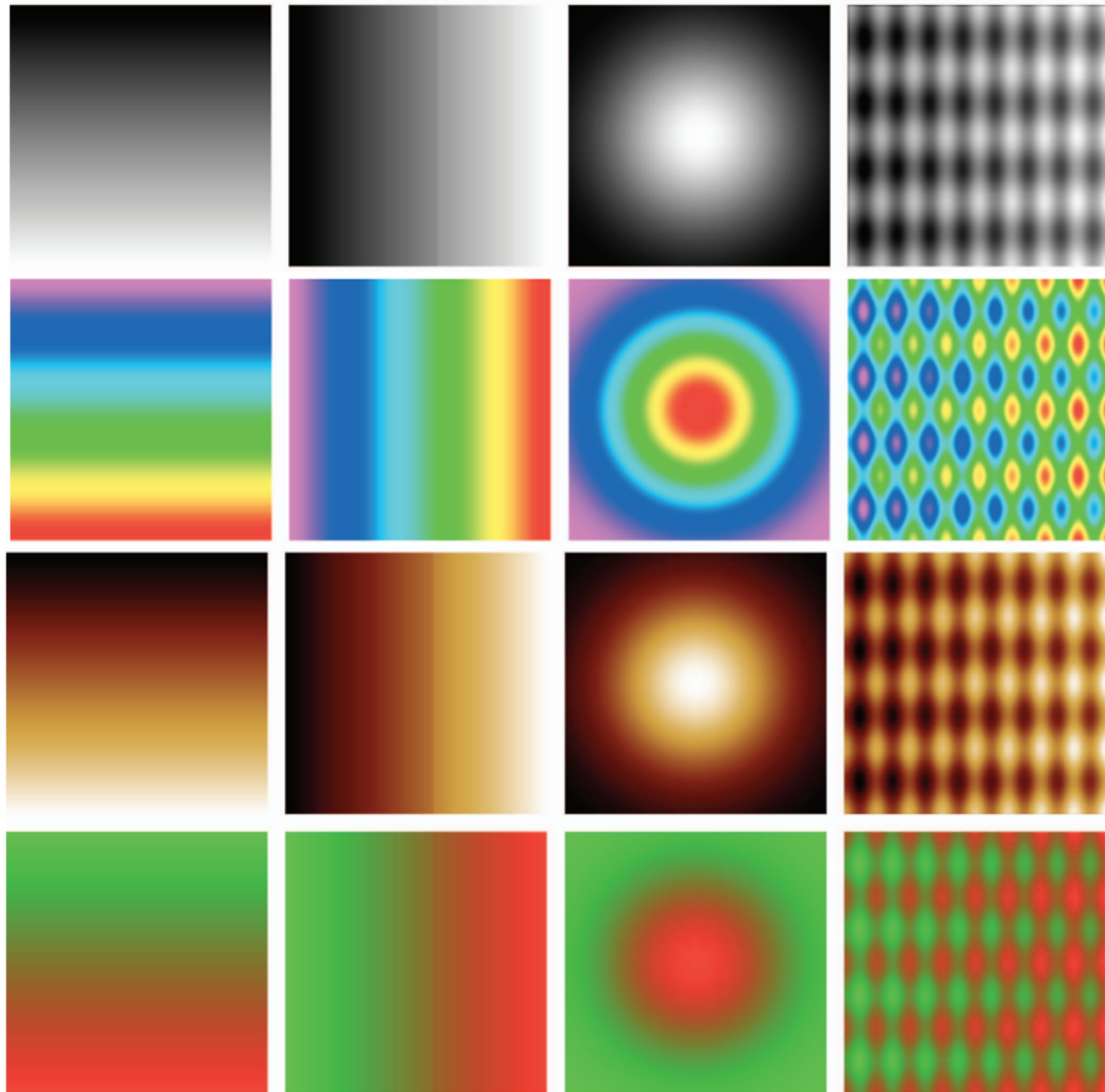
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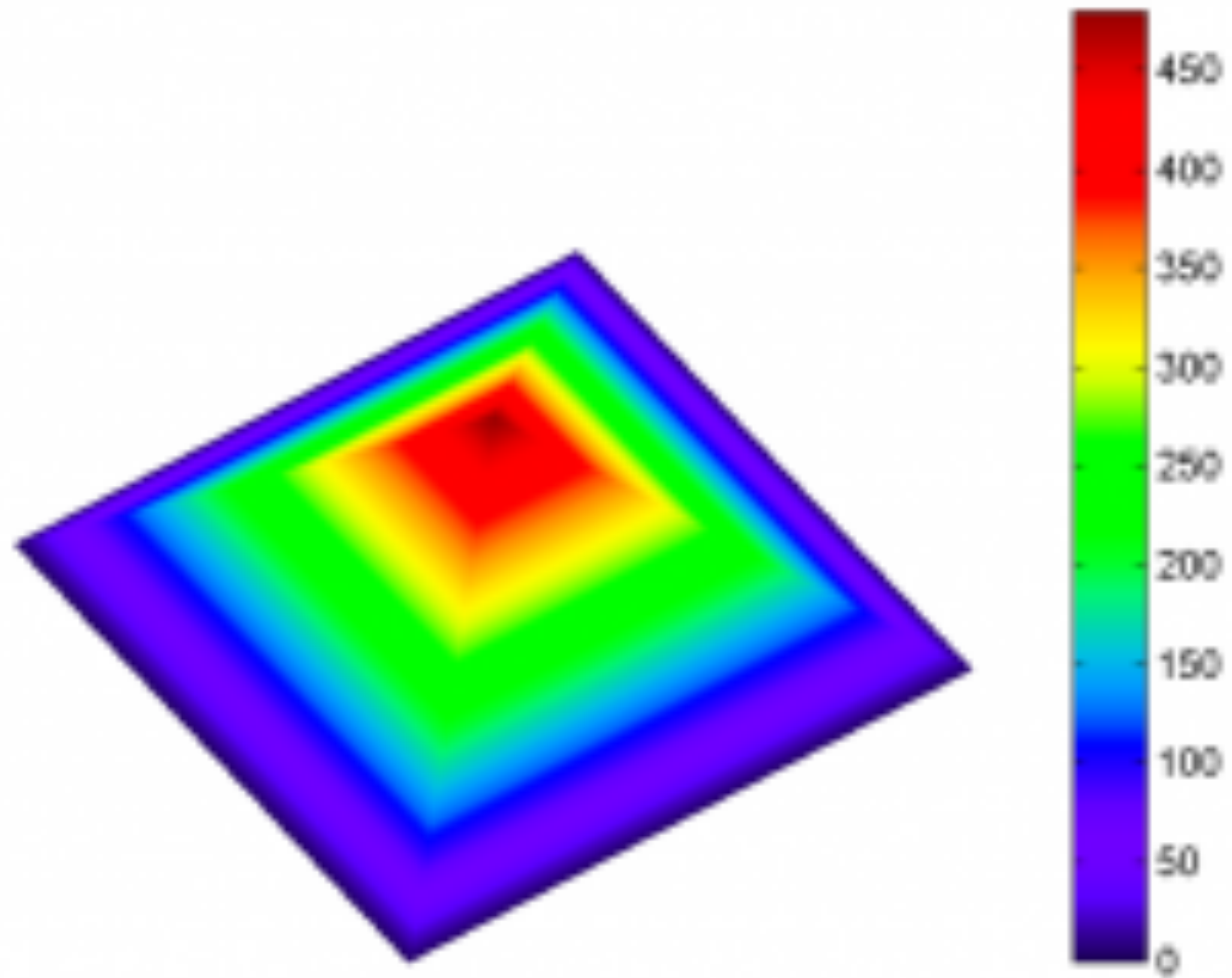


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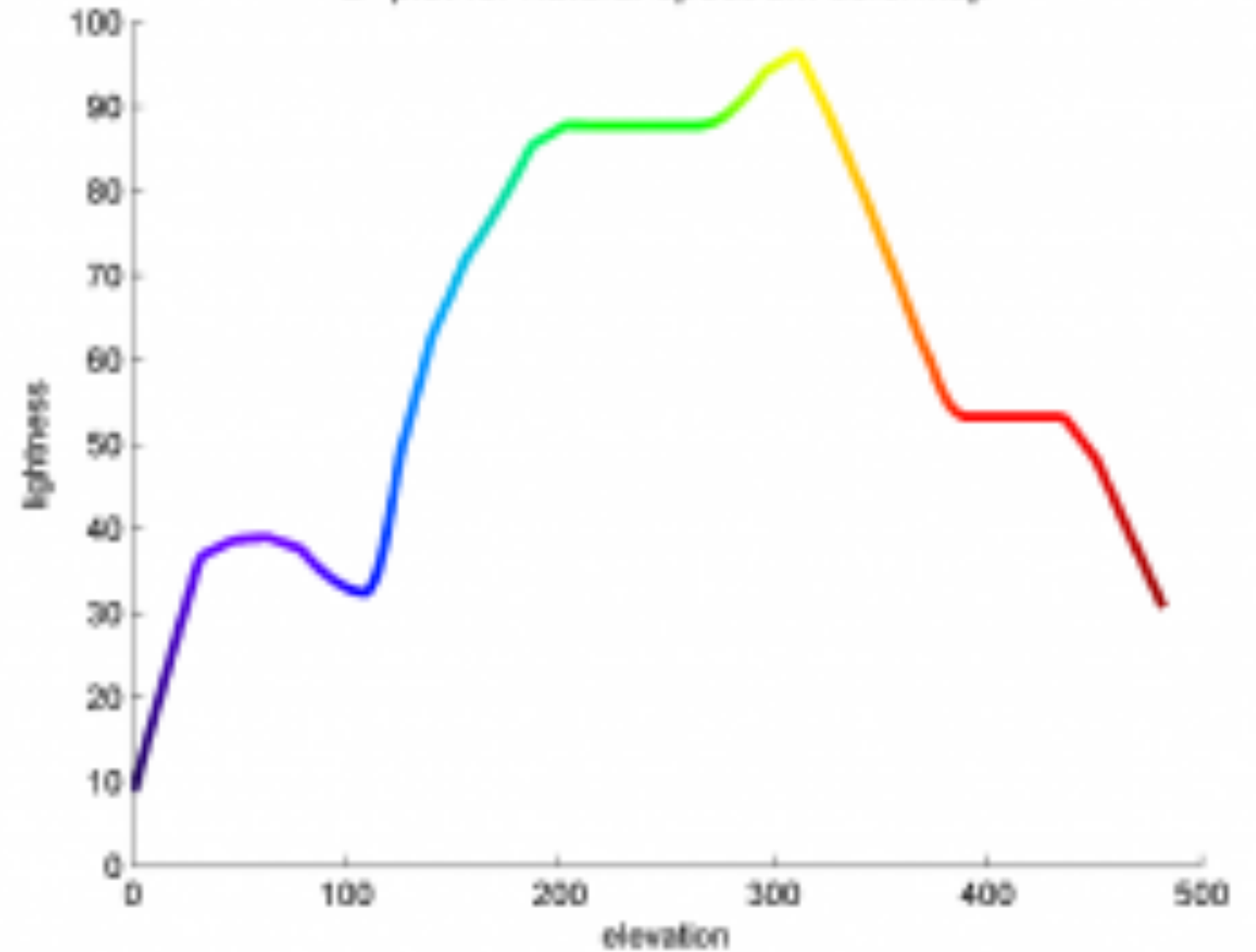


RAINBOW COLOR MAPS

Natural spectrum

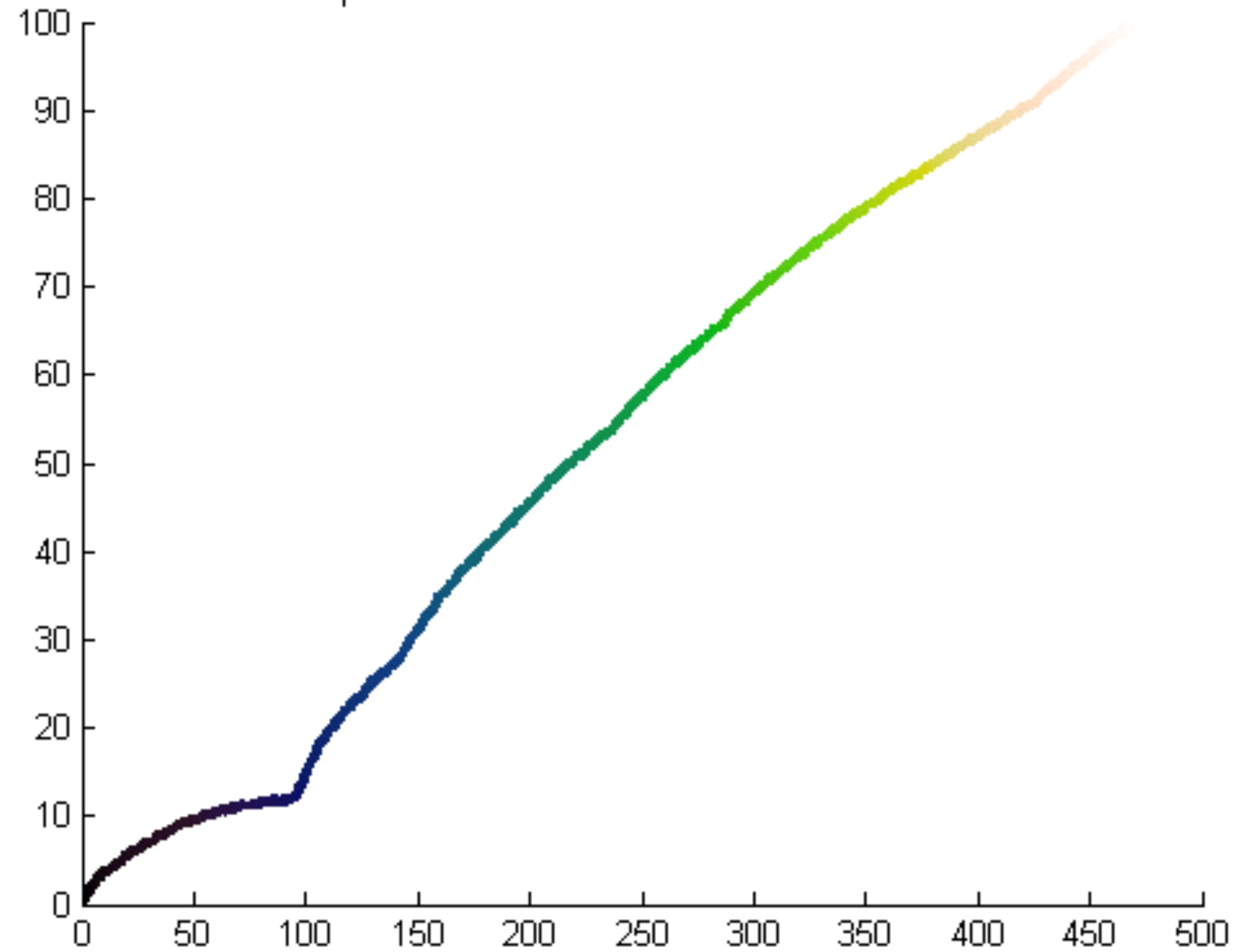


L* plot for natural spectrum colormap

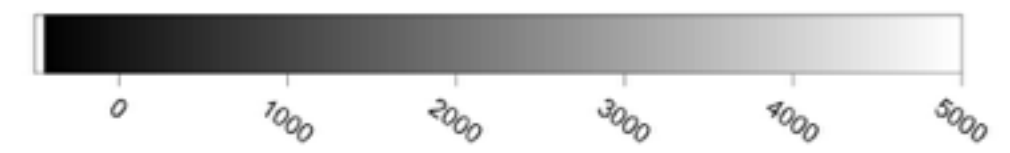
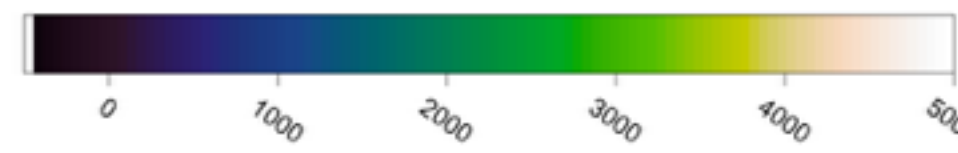
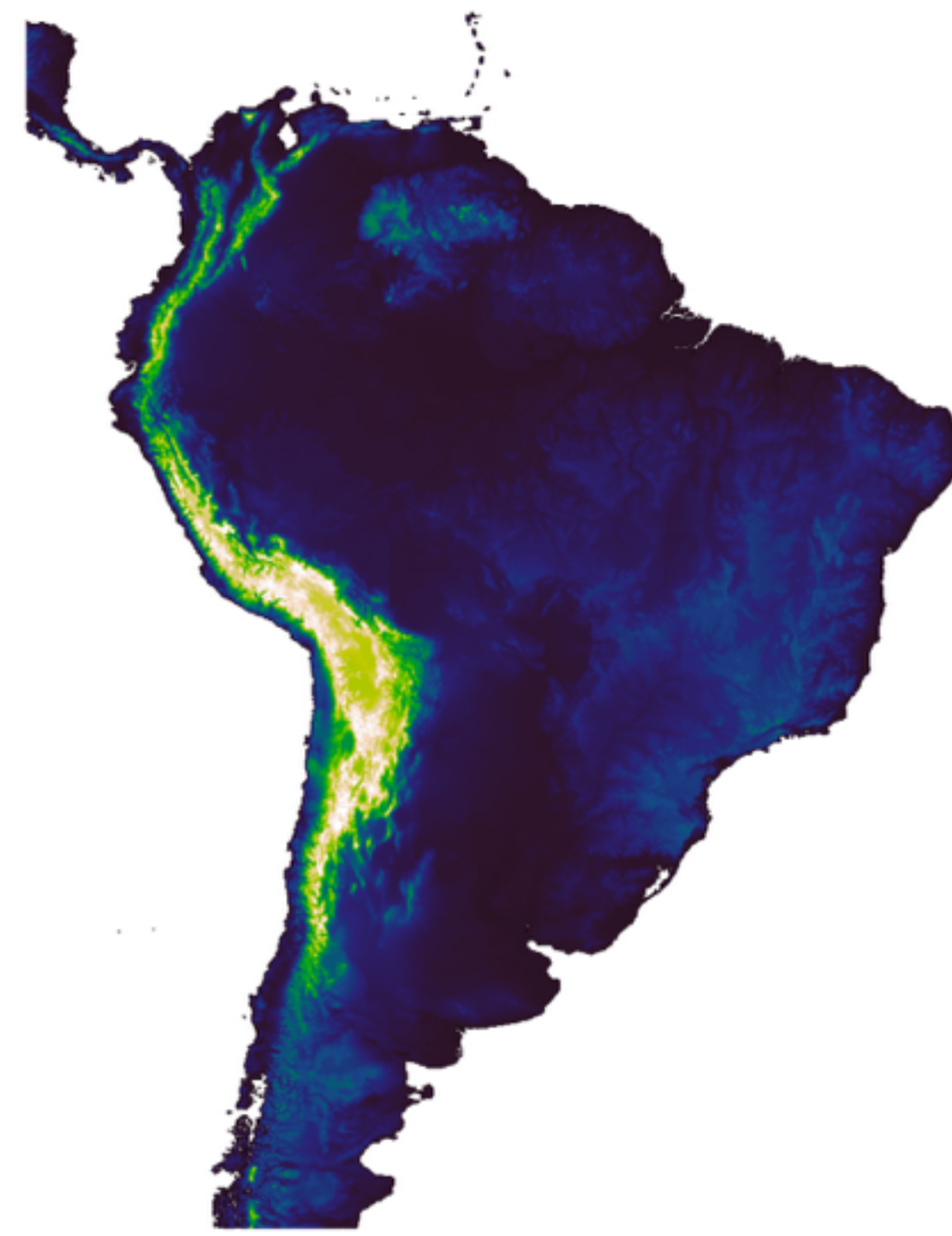
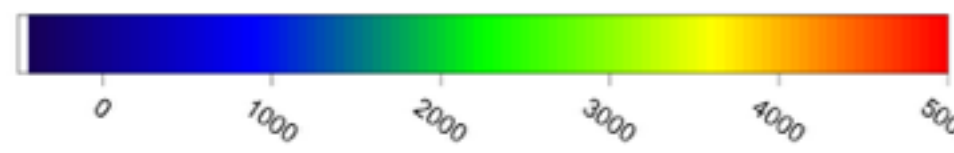
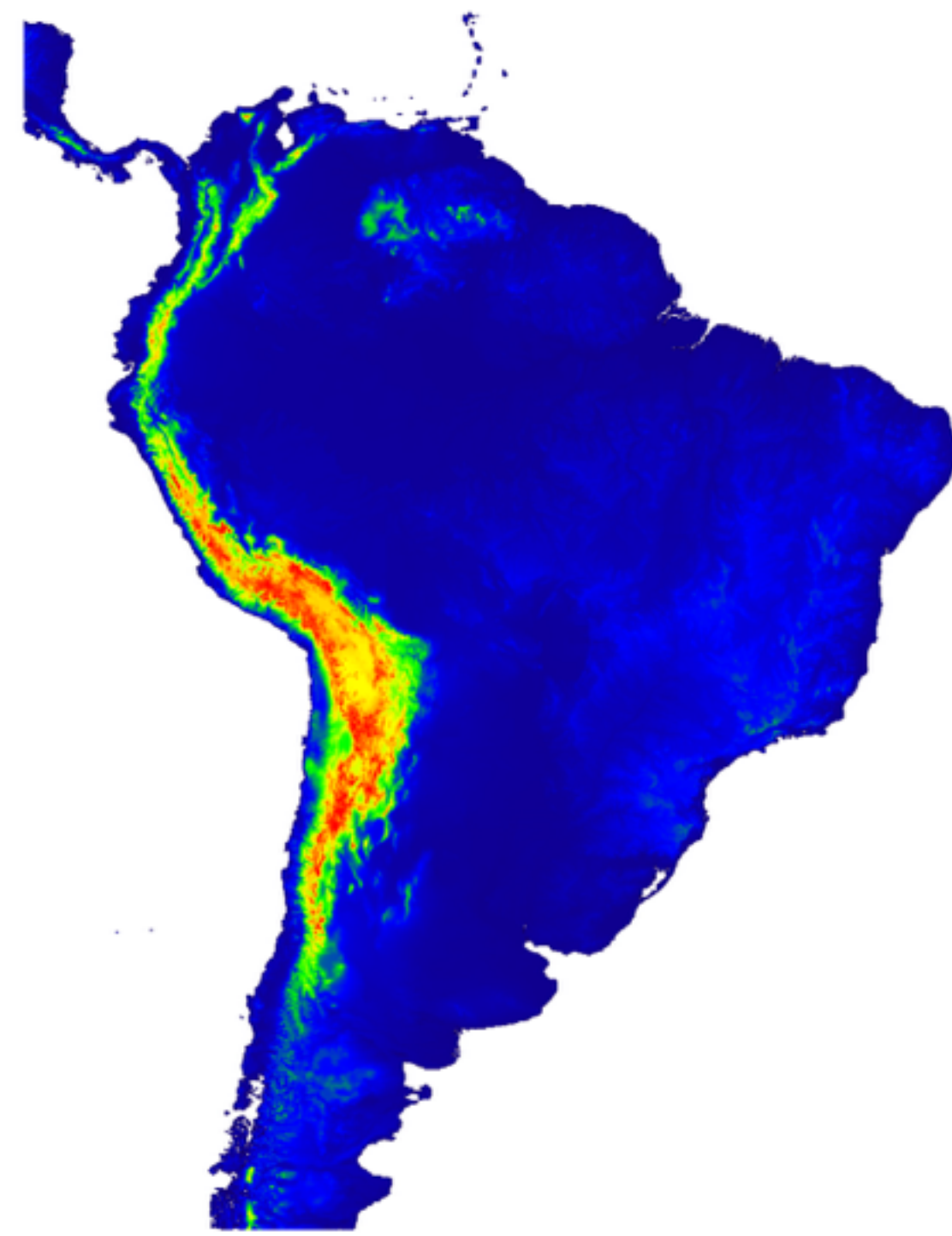
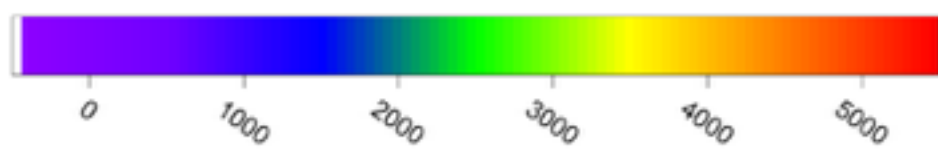


RAINBOW COLOR MAPS

L* plot for Kindlmann linear Luminance

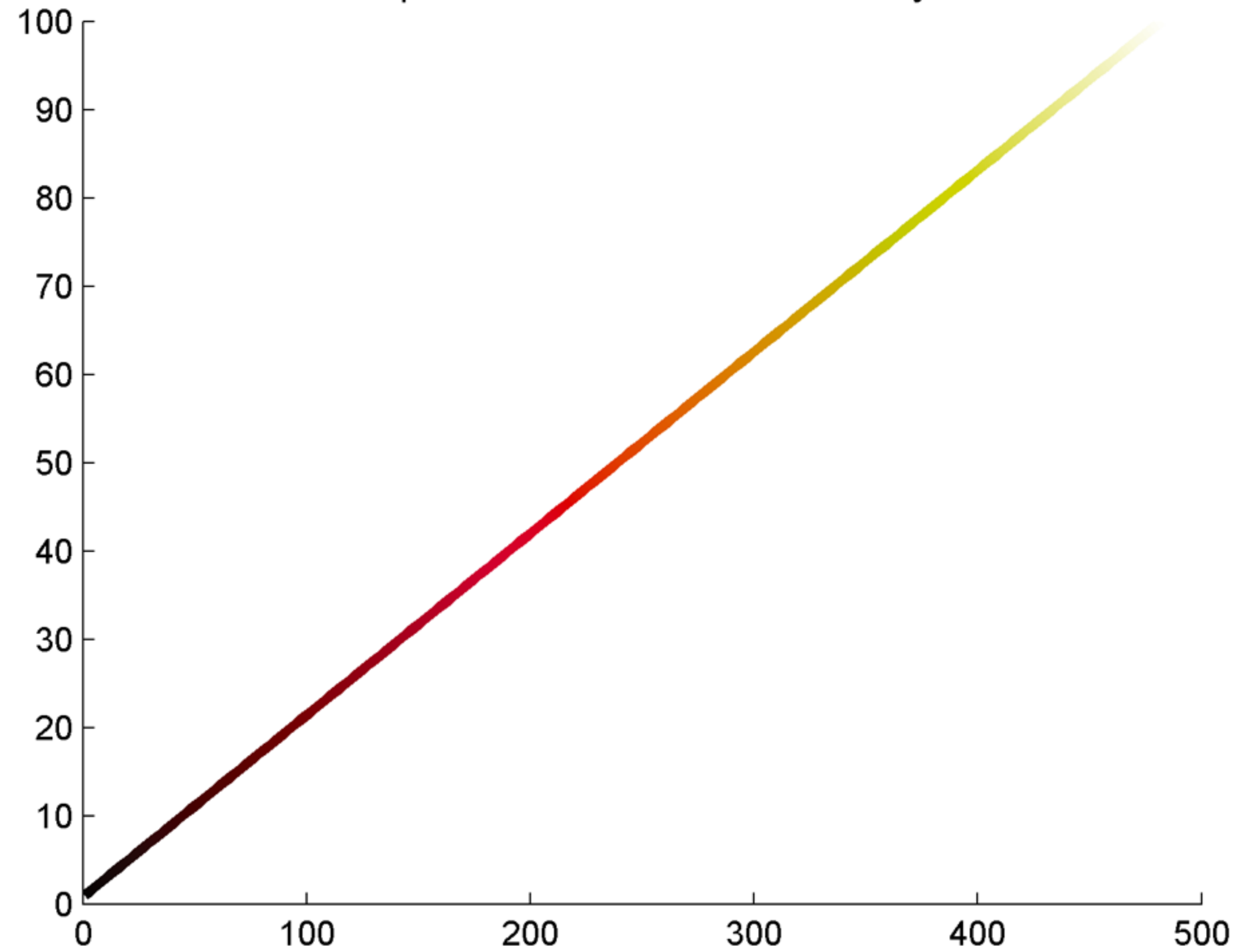


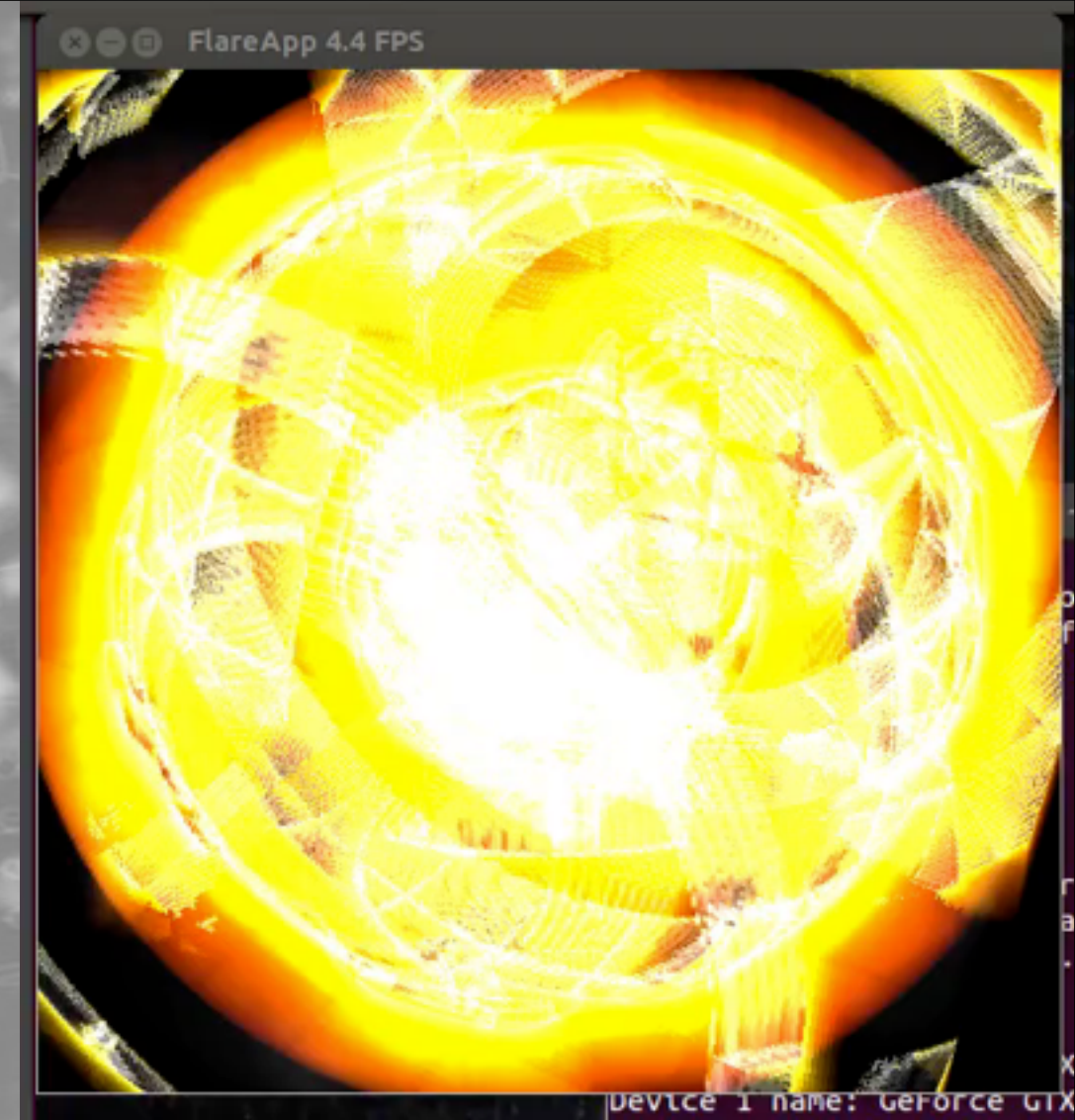
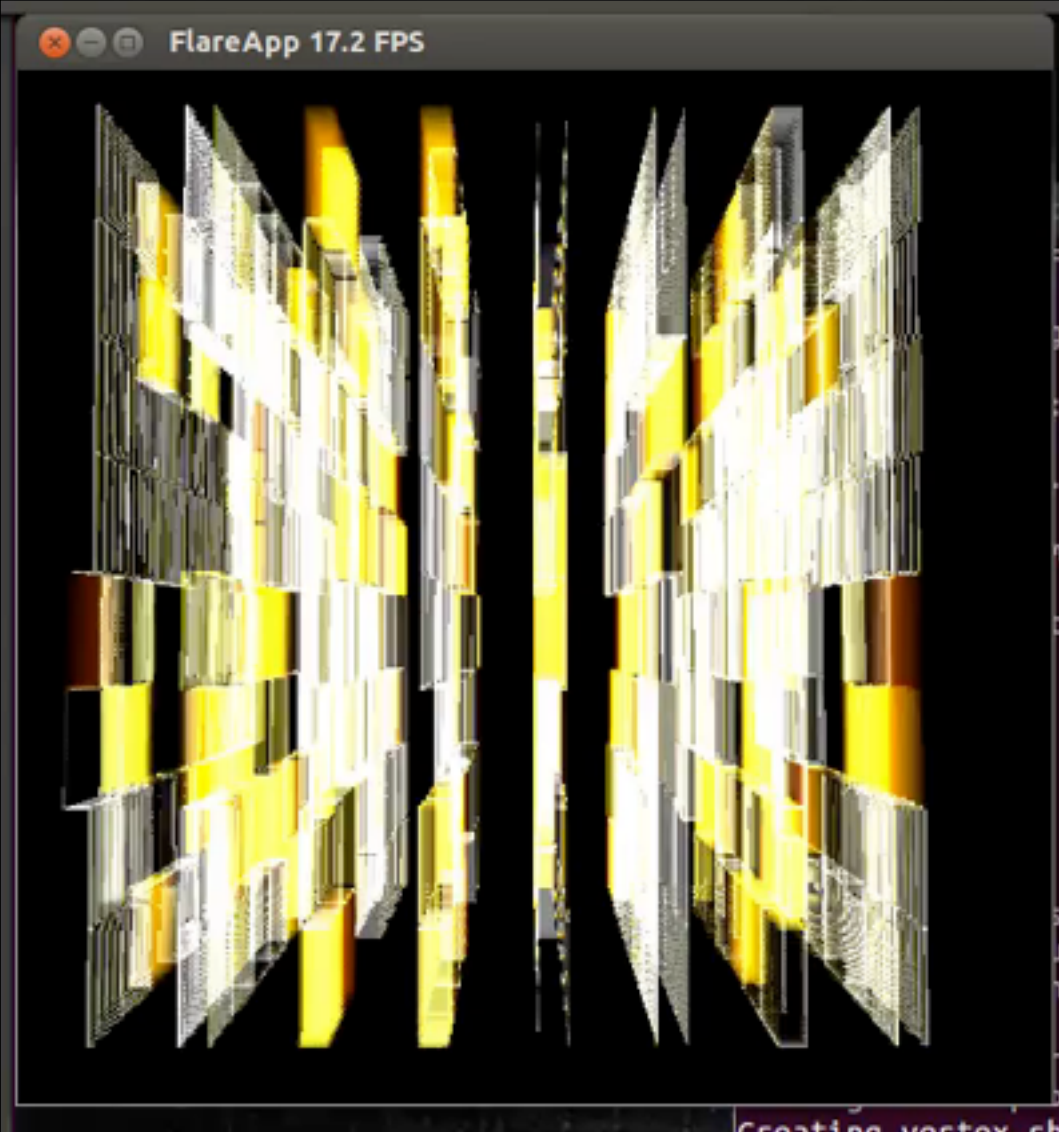
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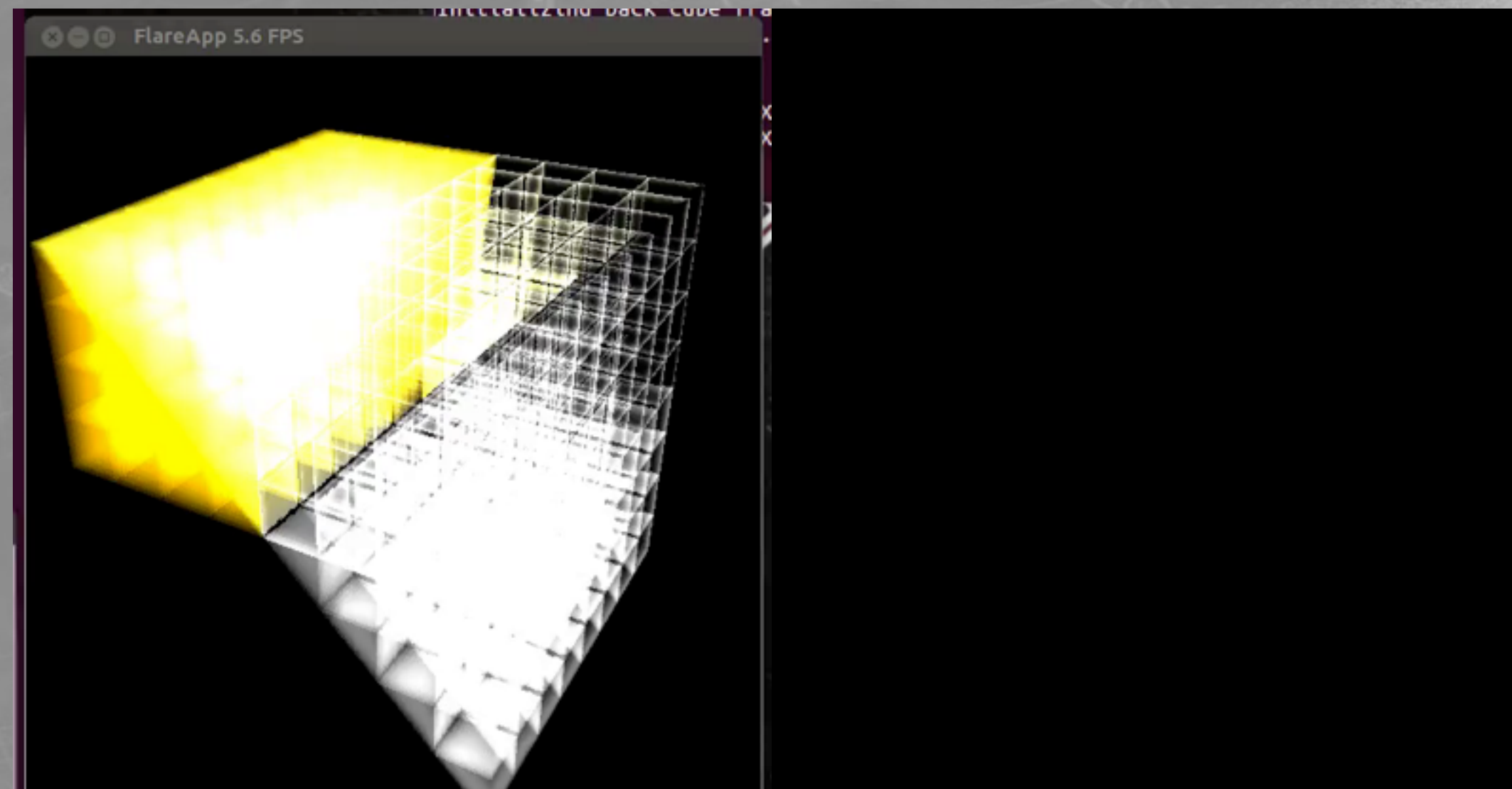
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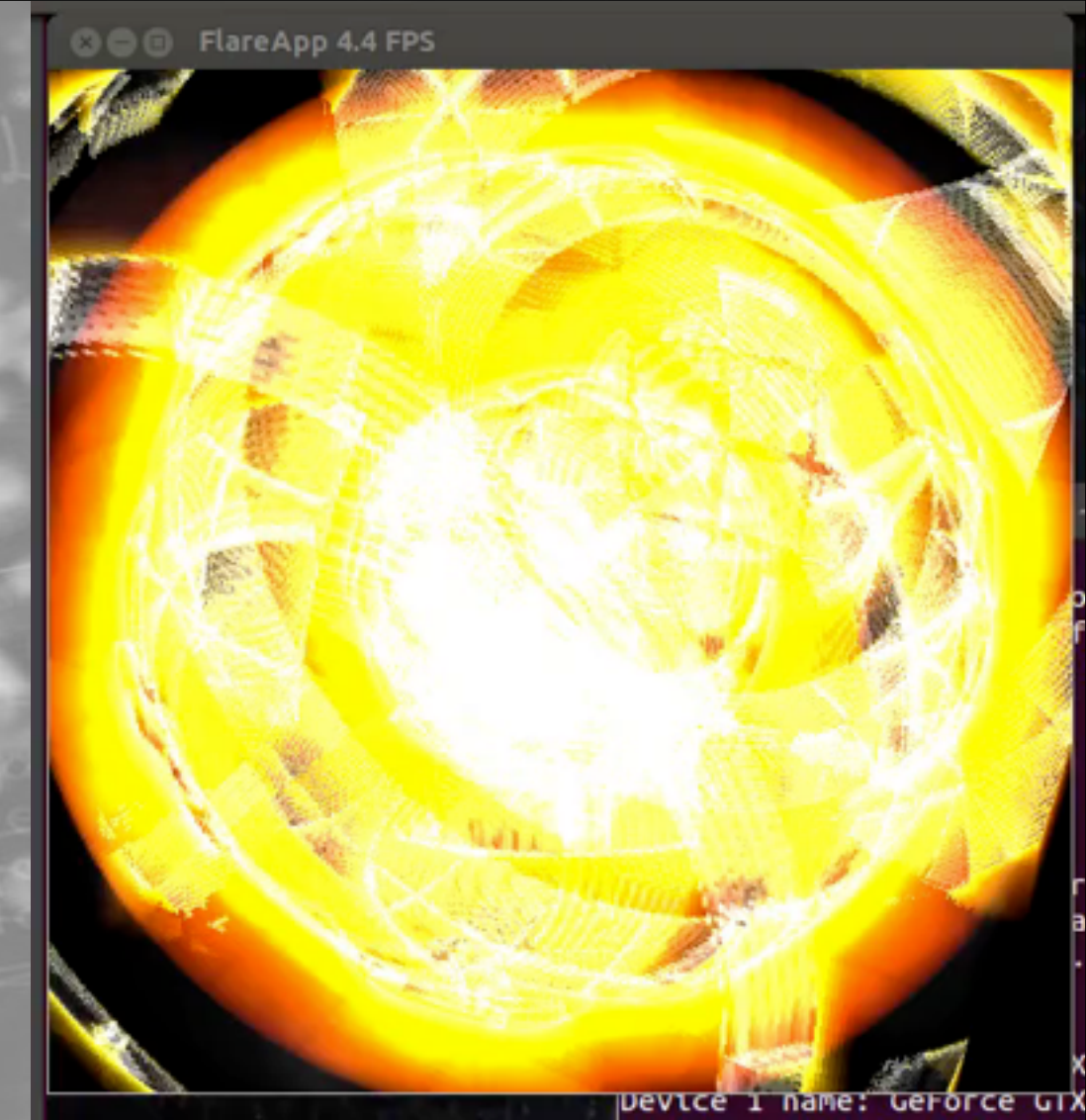
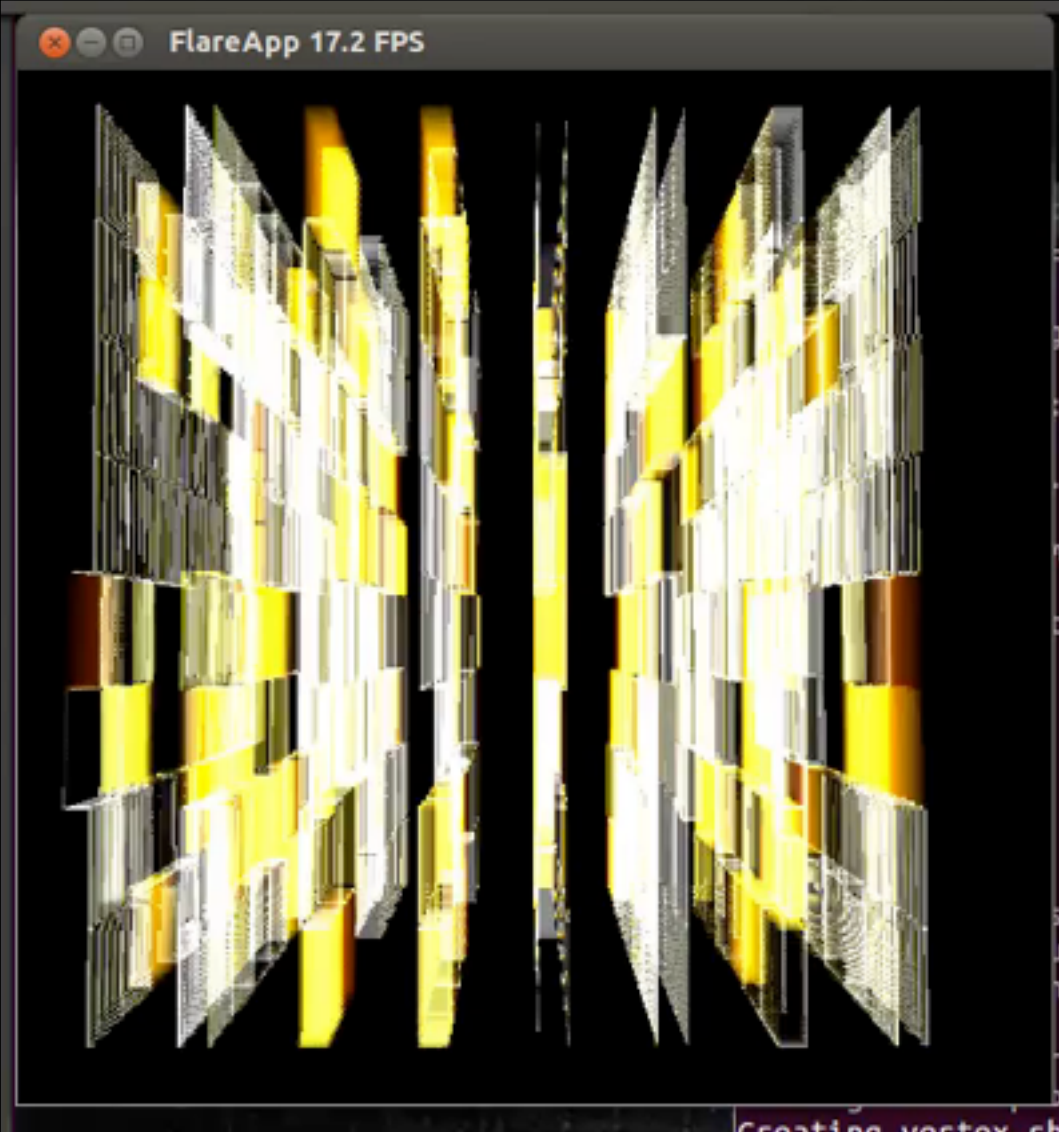
L* plot for linear L* heated body





THANK YOU!





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