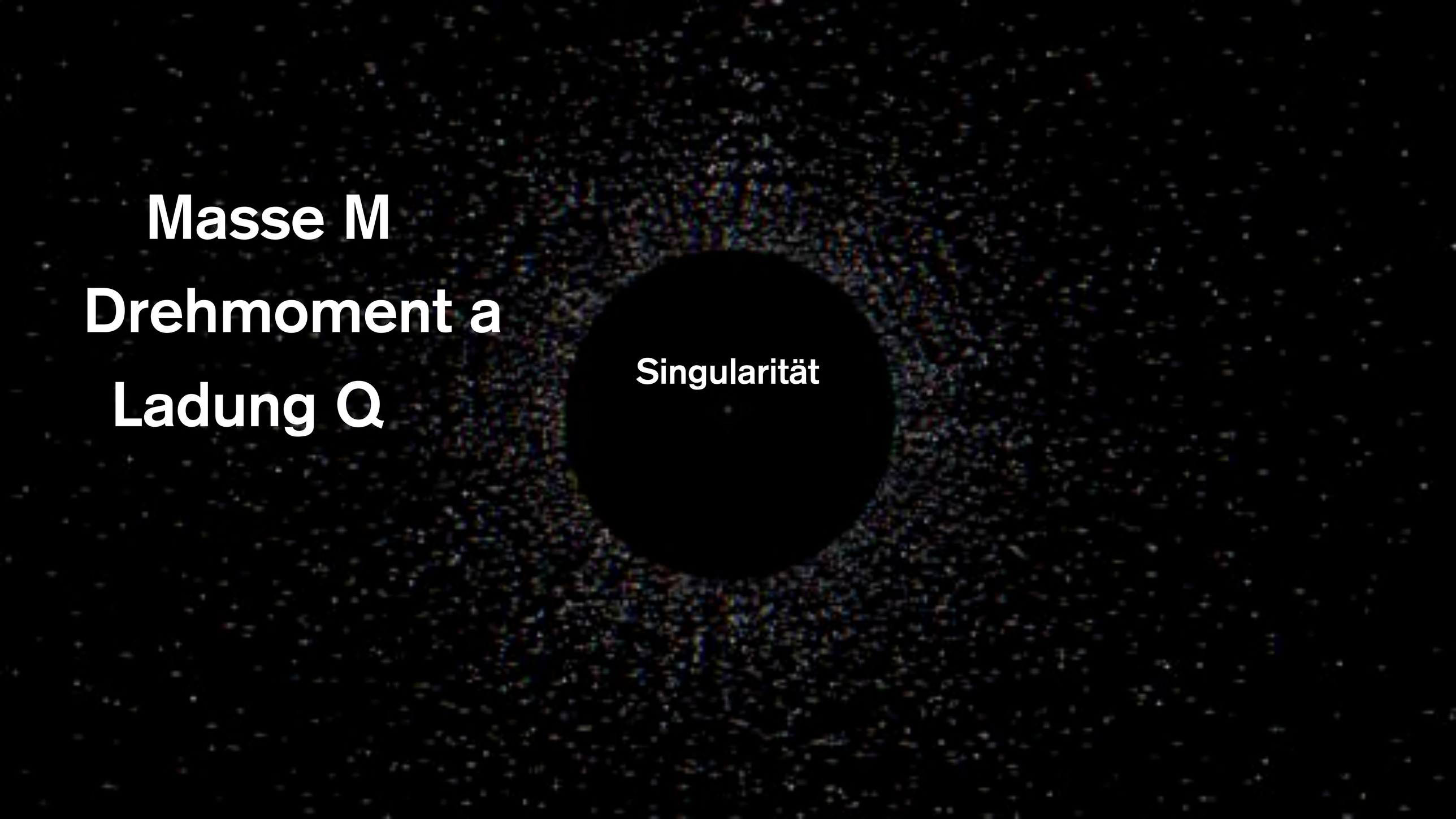
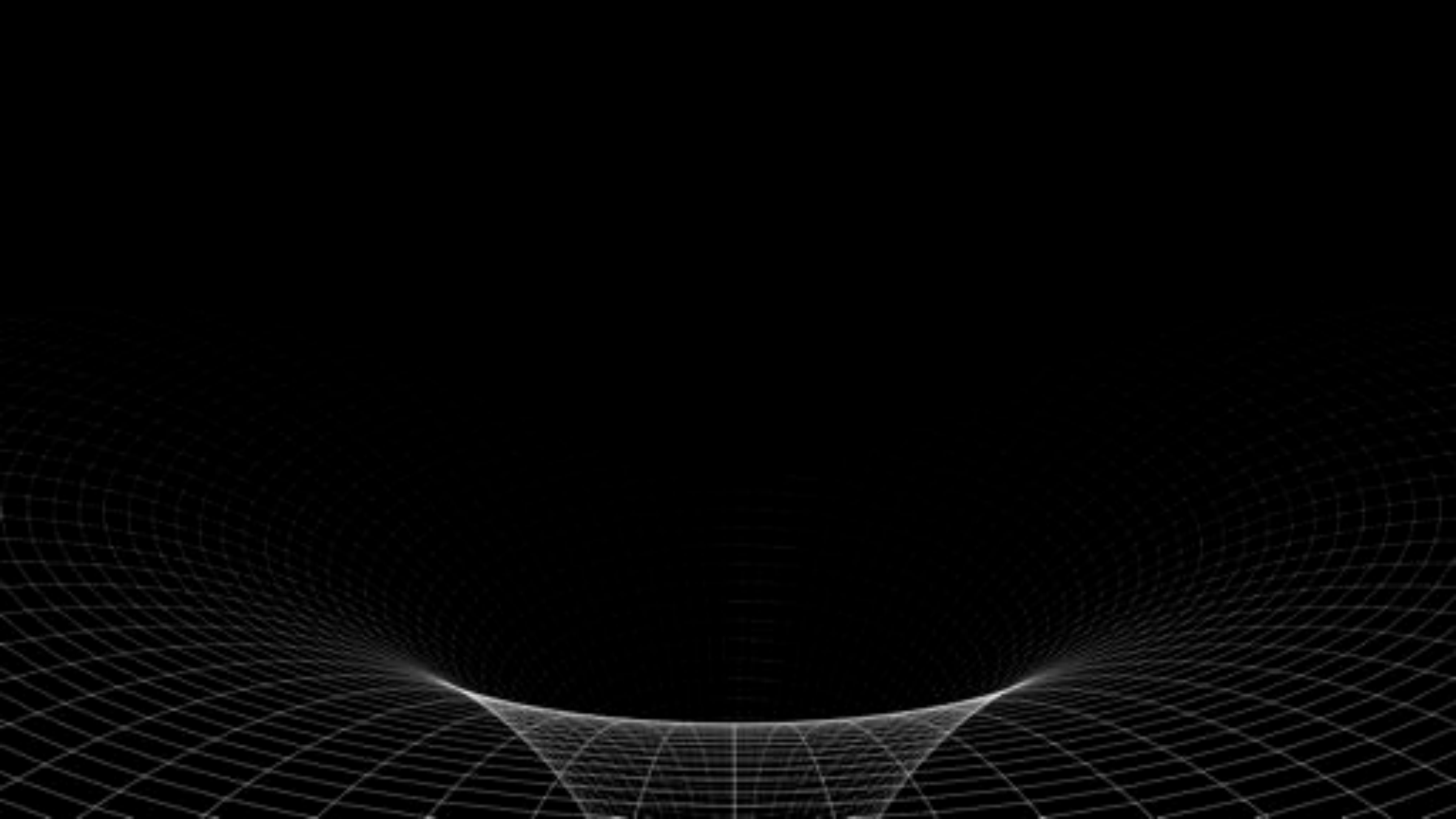
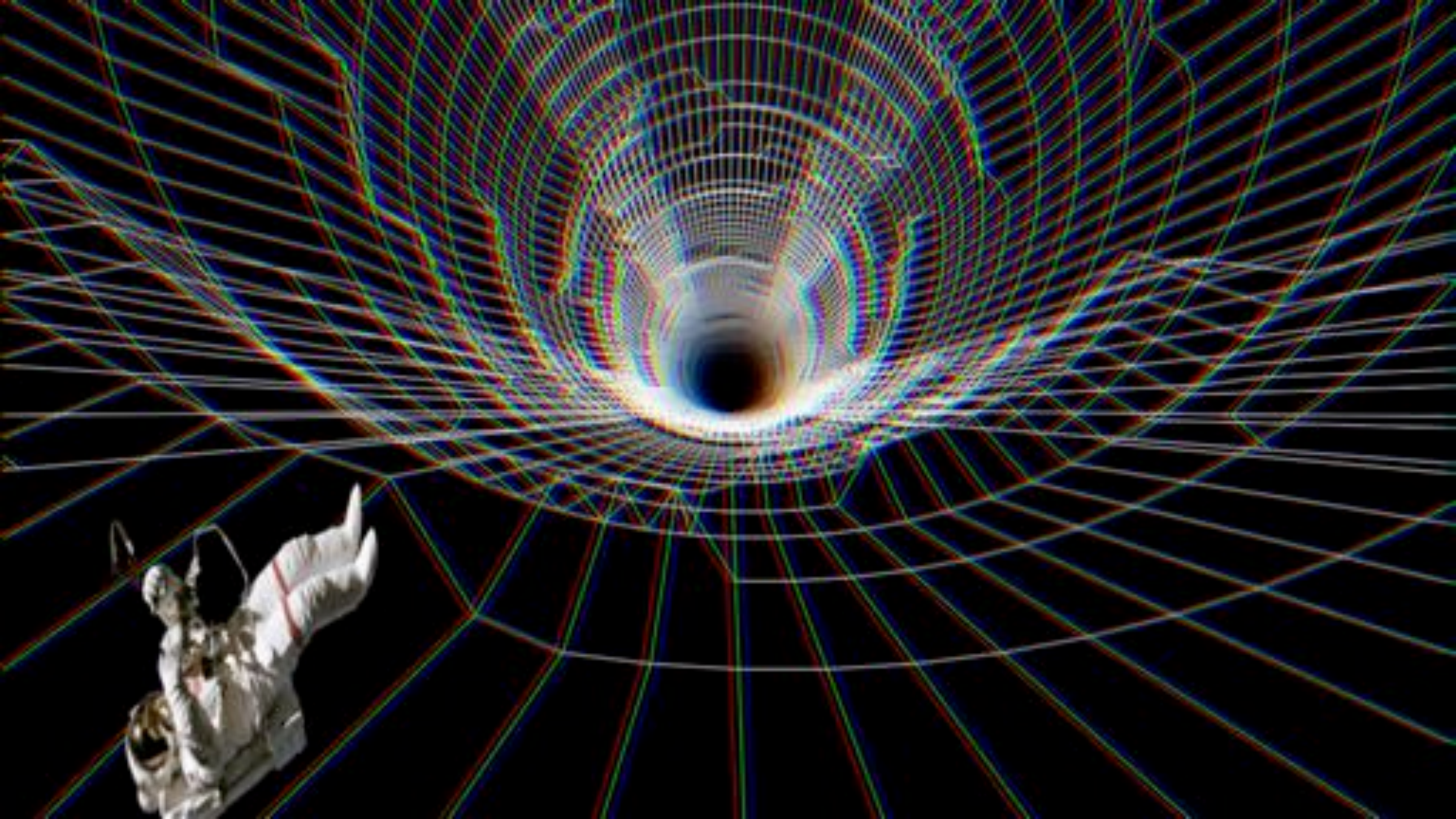
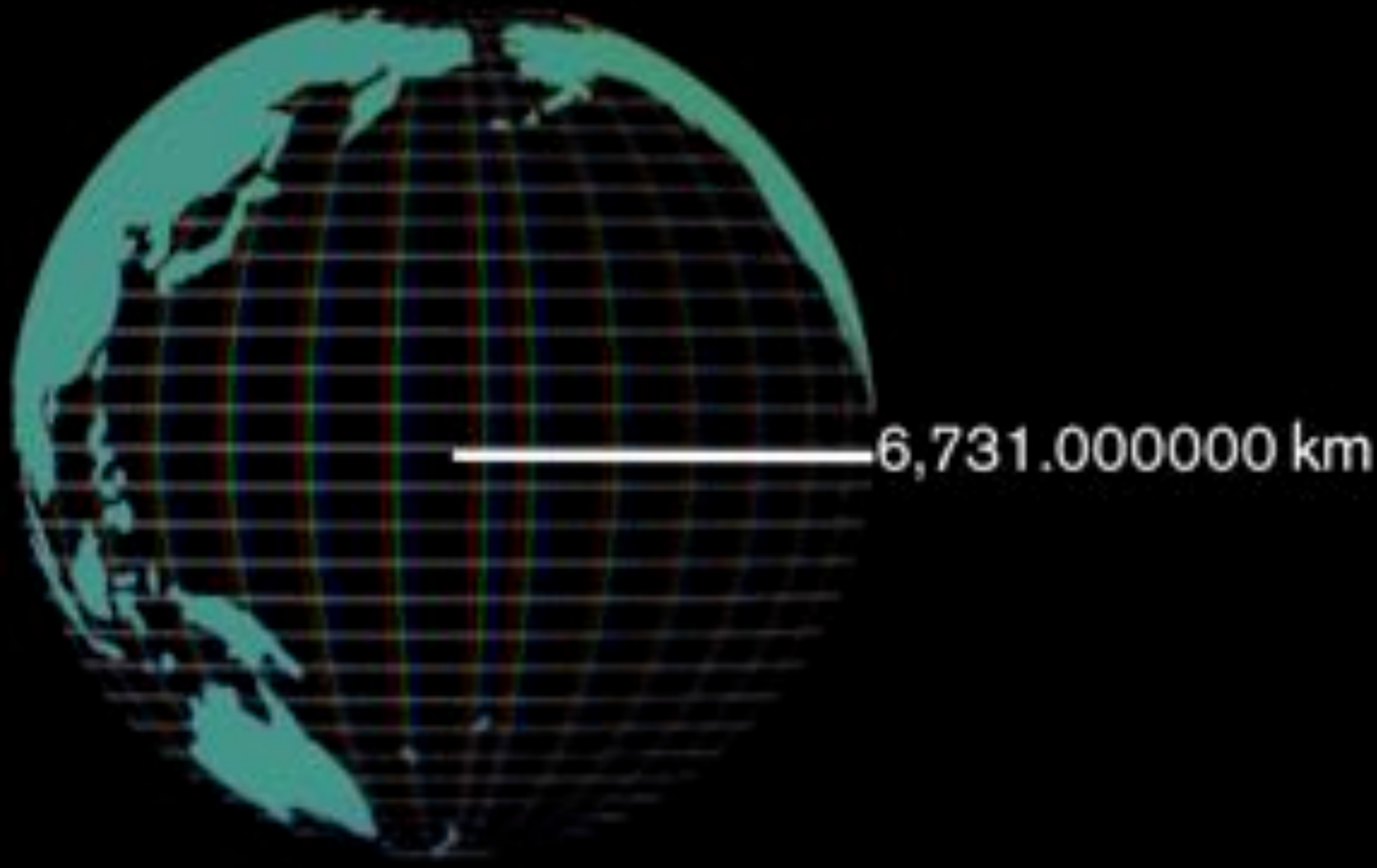
KEVIN
SCHAWINSKI

BLACK HOLES

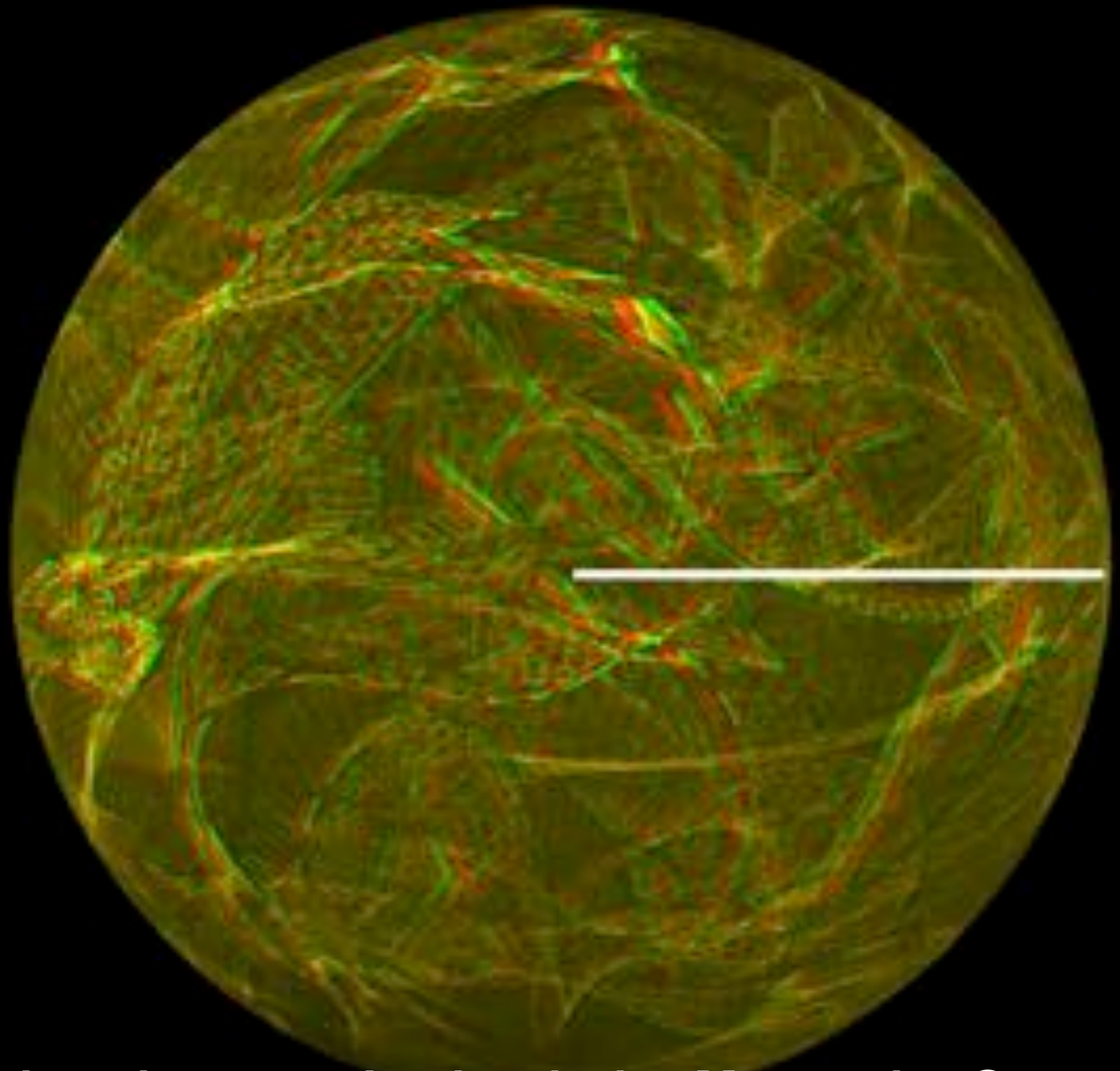

Masse M
Drehmoment a
Ladung Q
Singularität



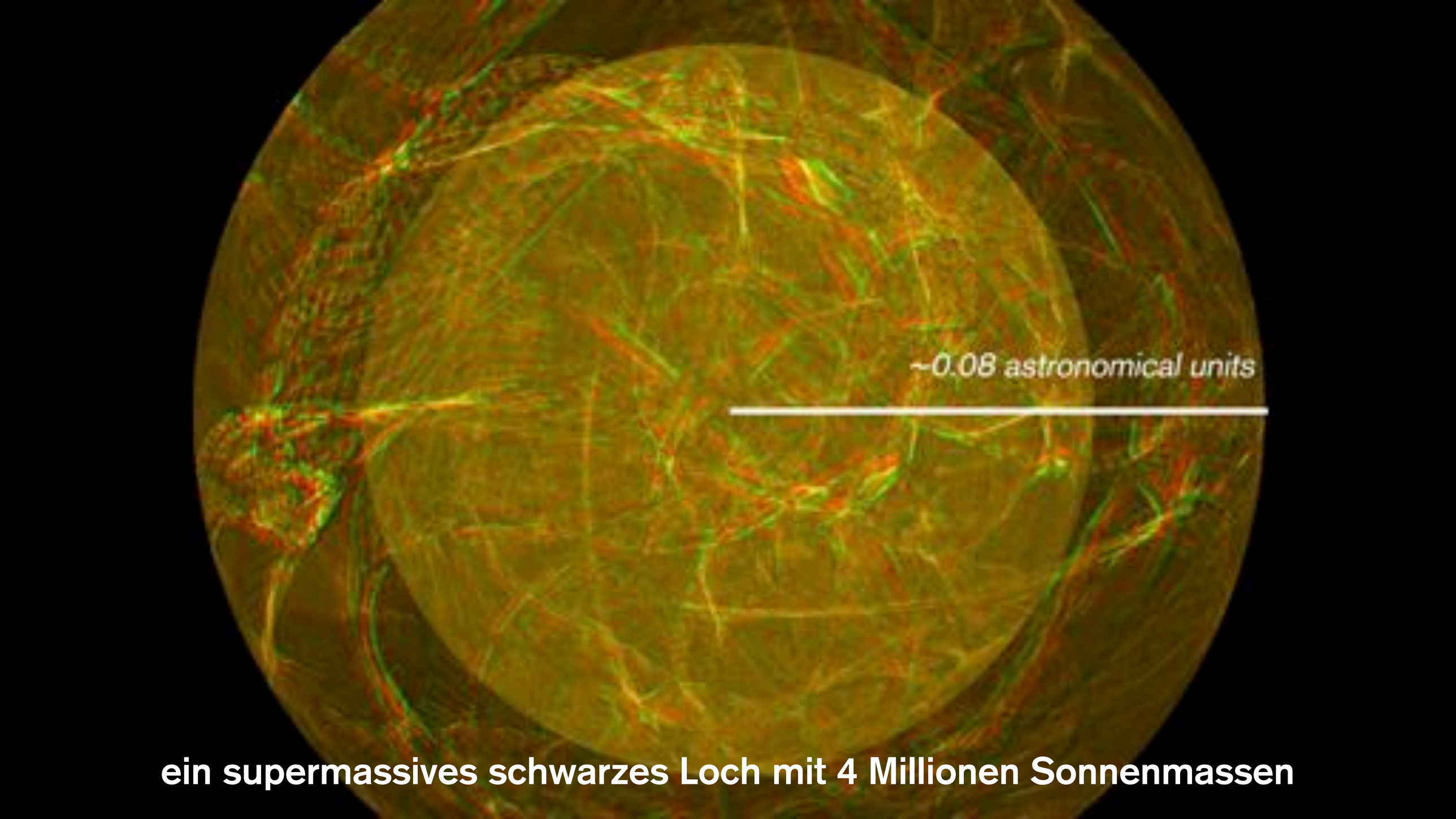




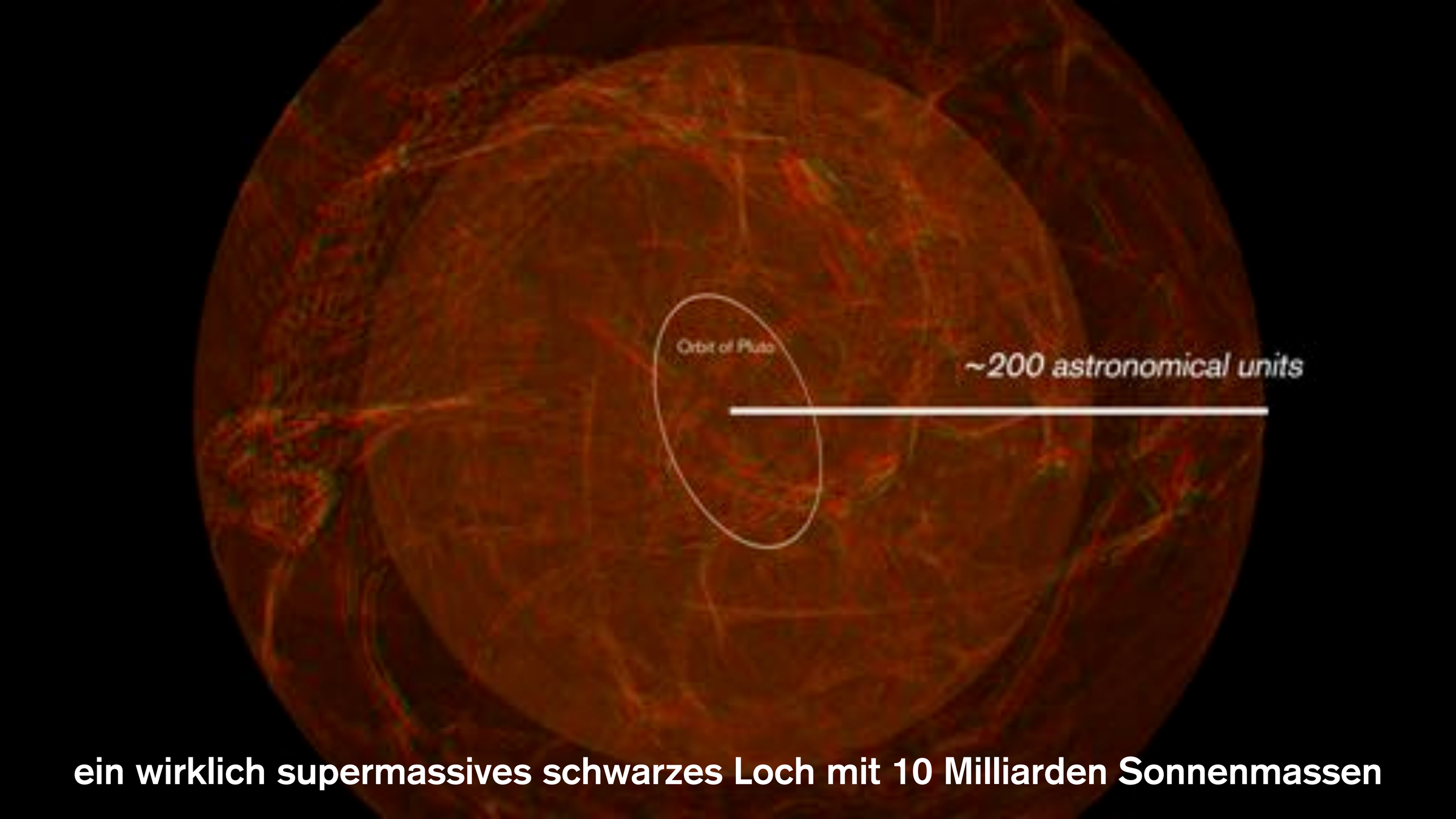
ein schwarzes Loch mit der Masse der Erde



ein schwarzes Loch mit der Masse der Sonne



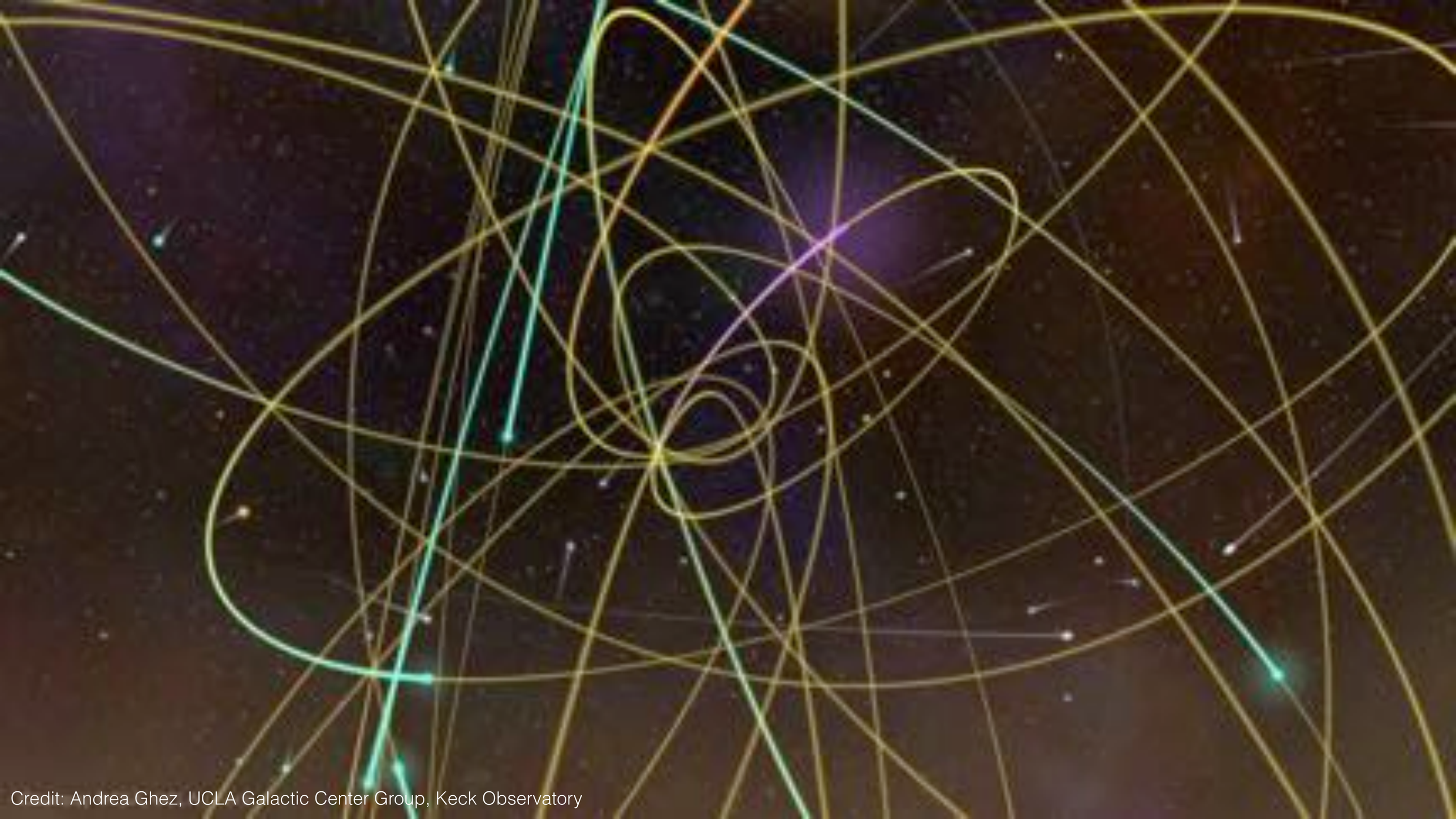
ein supermassives schwarzes Loch mit 4 Millionen Sonnenmassen



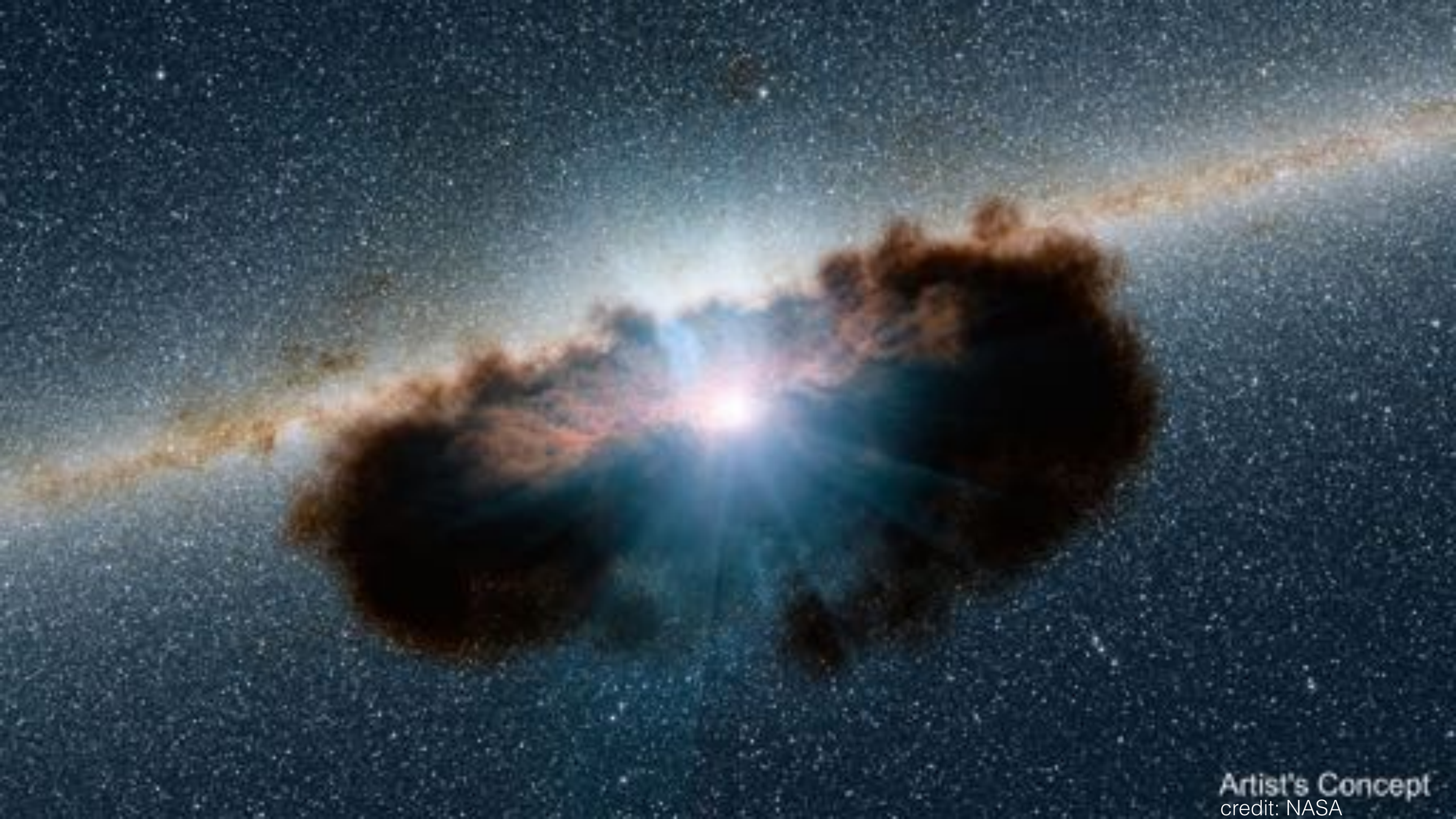
ein wirklich supermassives schwarzes Loch mit 10 Milliarden Sonnenmassen

Credit: @astrotanja

Credit: UniverseToday

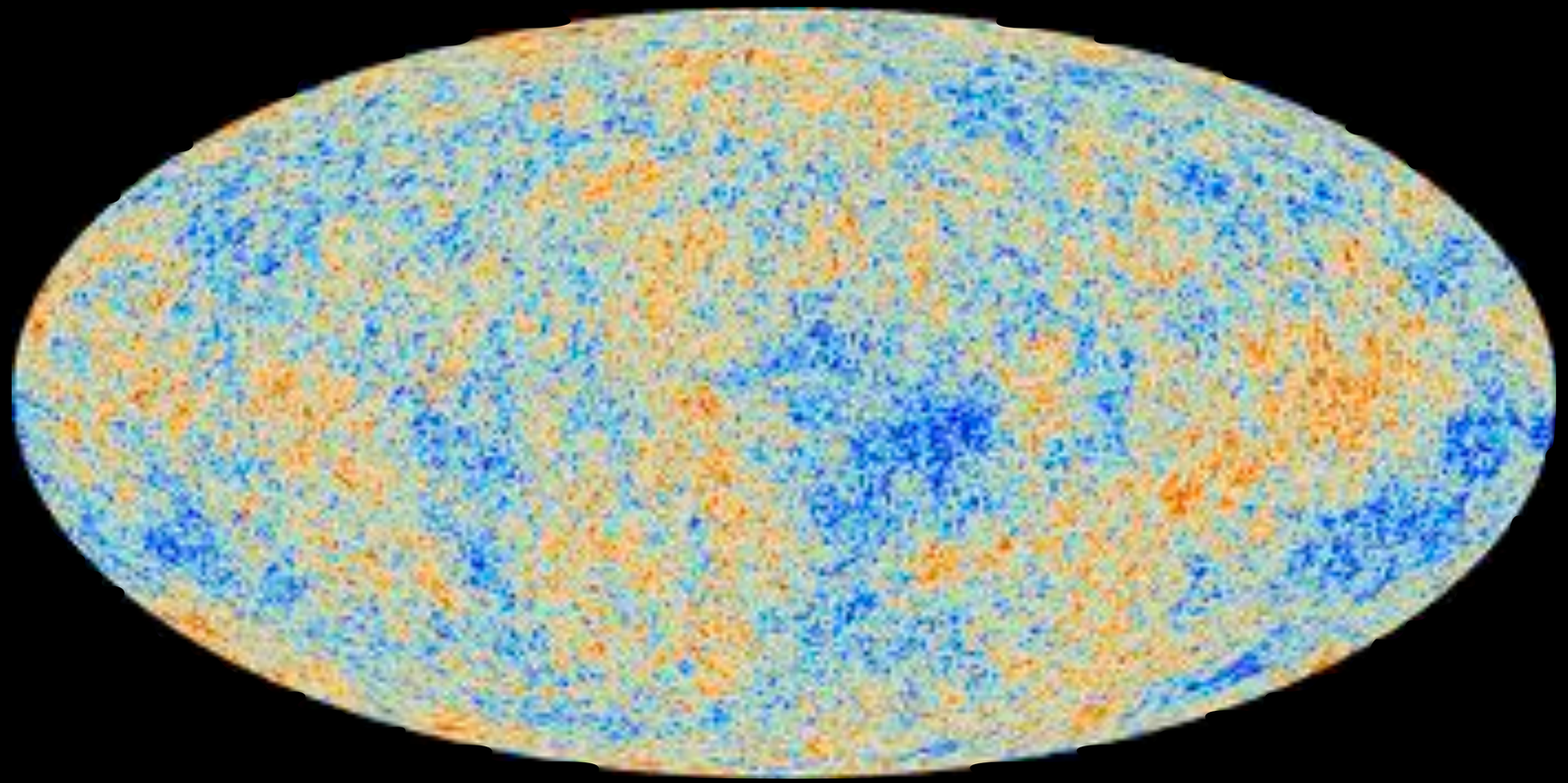


Credit: Andrea Ghez, UCLA Galactic Center Group, Keck Observatory


Artist's Concept
credit: NASA

3C 231; credit: NASA/ESA HST

Einführung in die Galaxienevolution



Schritt 1:
Quantenfluktuationen wachsen
während der Inflation

Einführung in die Galaxienevolution

Schritt 2:
Die “Merging Catastrophe”

Schritt 3:
Dunkle Materie und Galaxienhalos

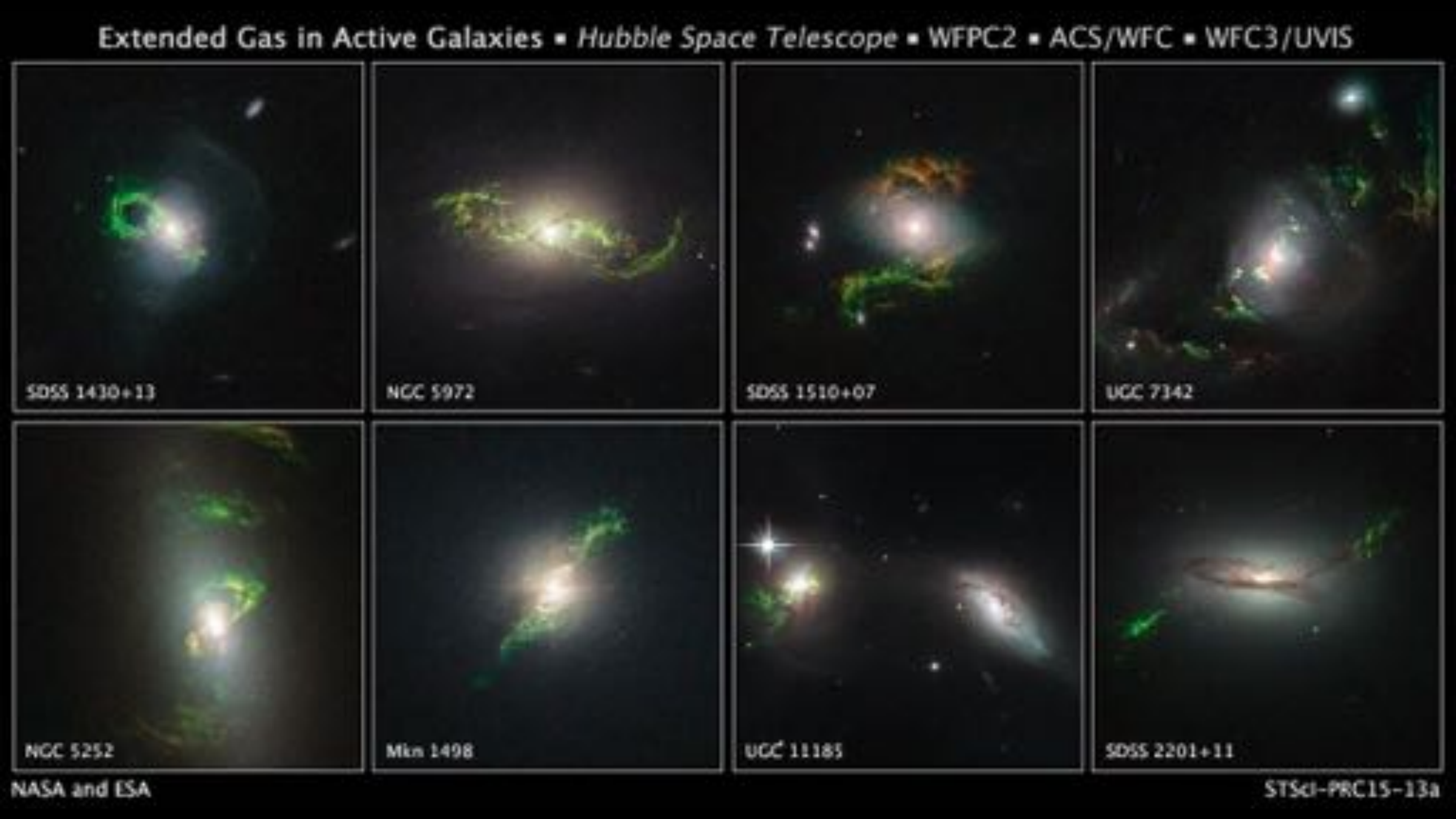
Schritt 4:
Wie kühlen Gase und formen Galaxien

Time since the Big Bang: 0.4 billion years

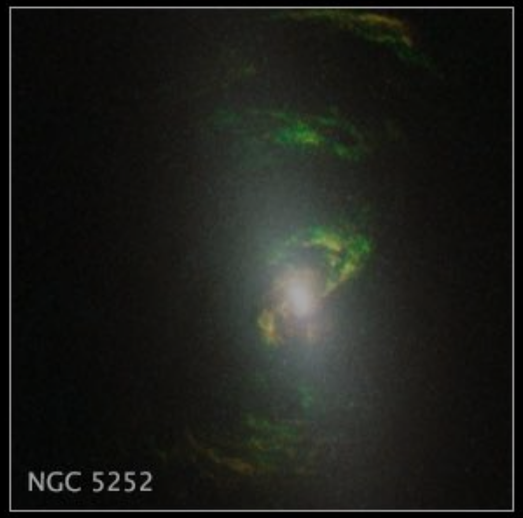
ILLUSTRIS

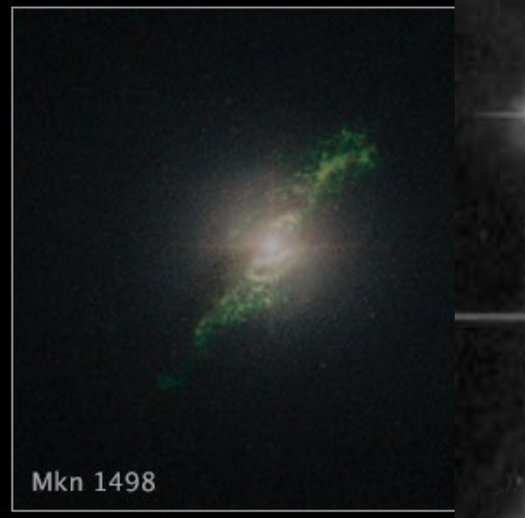
Credit: M. Vogelsberger (MIT), ILLUSTRIS collaboration

Chandra CDFS 4 Msec deep field

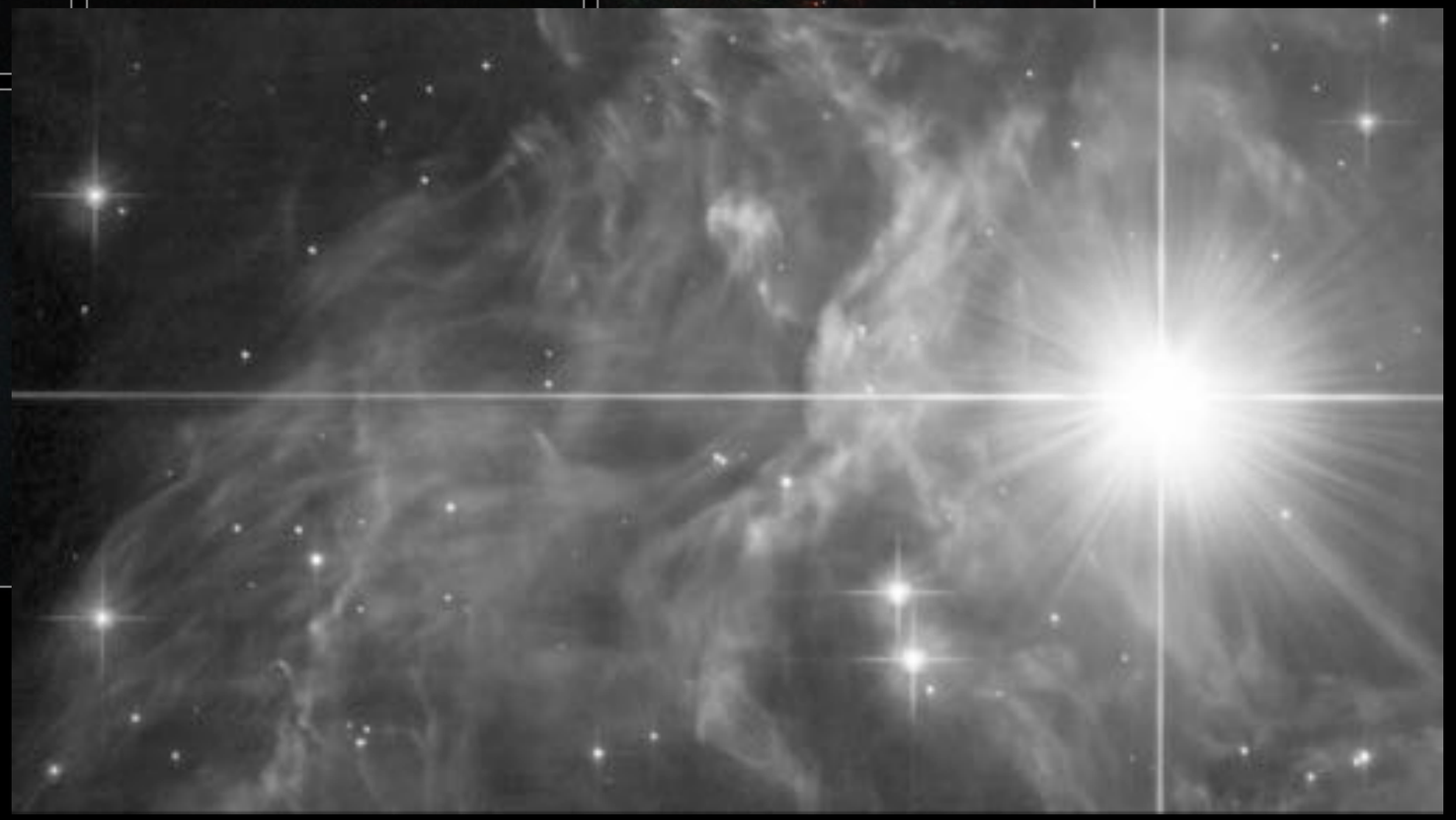

Extended Gas in Active Galaxies ▪ *Hubble Space Telescope* ▪ WFPC2 ▪ ACS/WFC ▪ WFC3/UVIS
SDSS 1430+13
NGC 5972
SDSS 1510+07
UGC 7342
NGC 5252
Mkn 1498
UGC 11185
SDSS 2201+11
NASA and ESA
STScI-PRC15-13a

Extended Gas in Active Galaxies ▪ *Hubble Space Telescope* ▪ WFPC2 ▪ ACS/WFC ▪ WFC3/UVIS





NASA and ESA

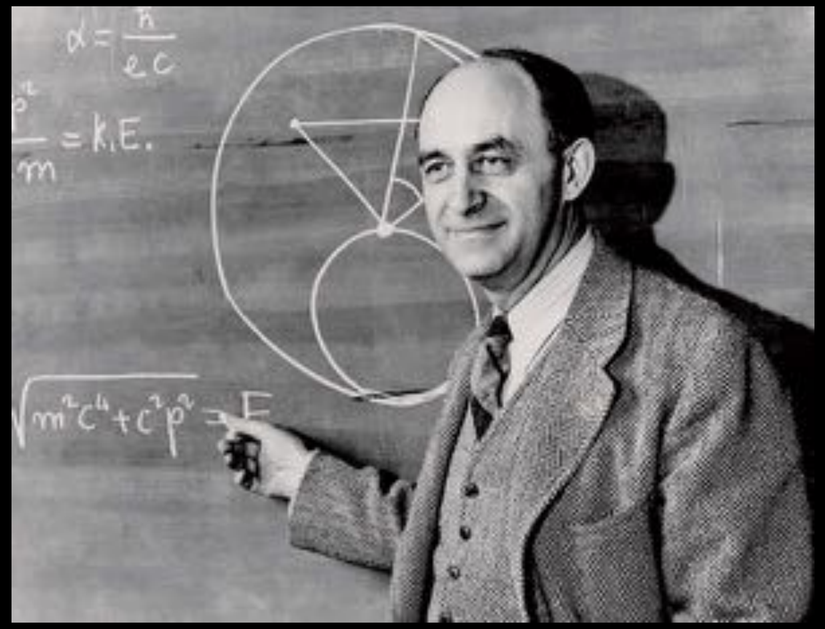


Not an active black hole, but a star, credit: HST, H. Bond (STScI)

Credit:Andrew Hamilton, JILA

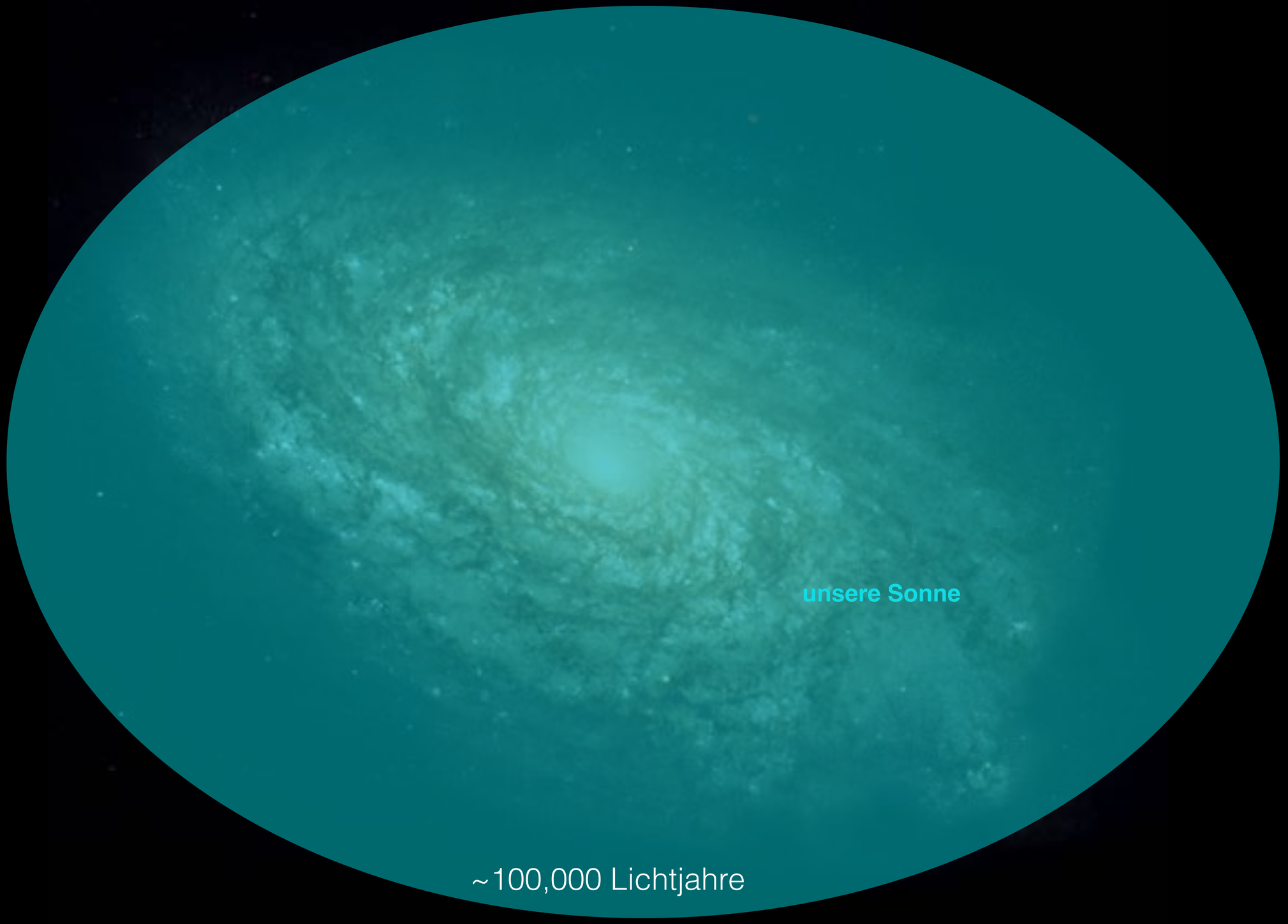
credit: Herge

Wo sind den alle?

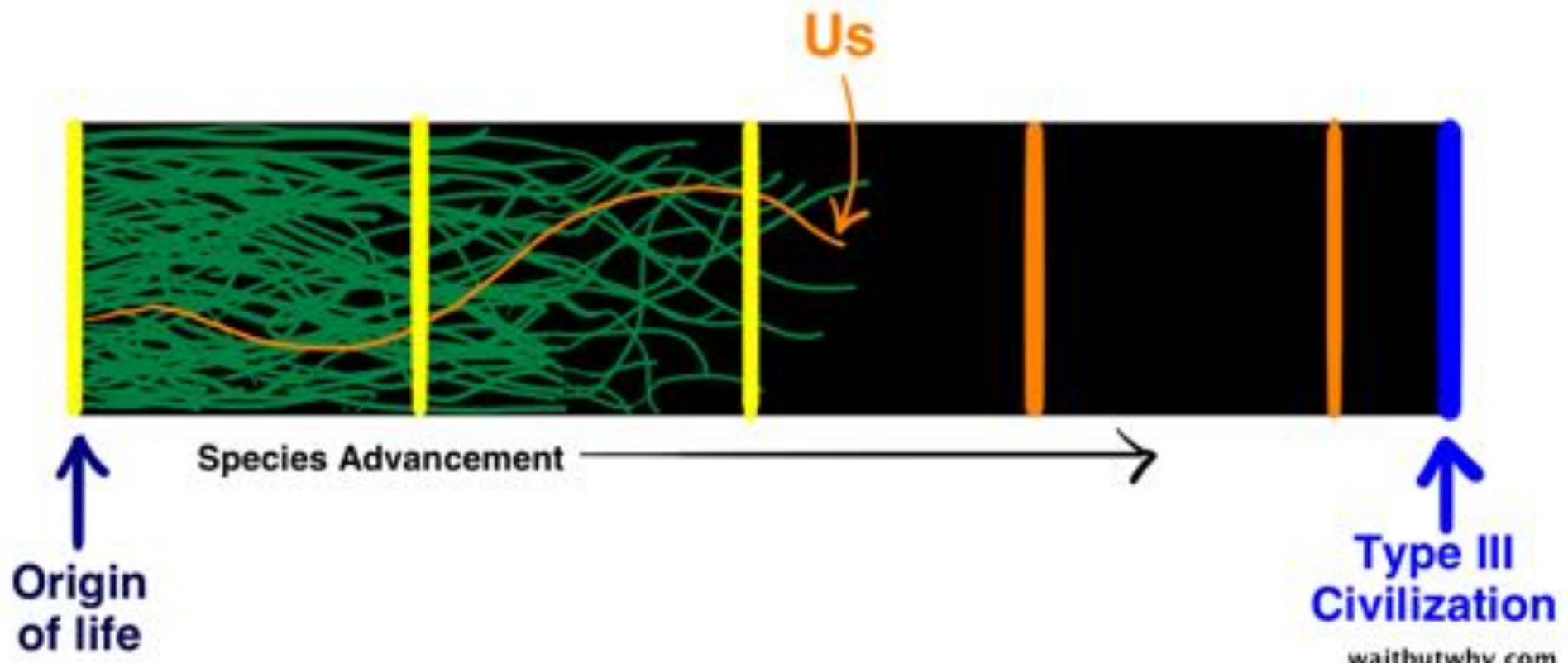


Enrico Fermi

~100,000 Lichtjahre


unsere Sonne
~100,000 Lichtjahre

Gibt es einen “Grossen Filter”?



credit: Tim Urban

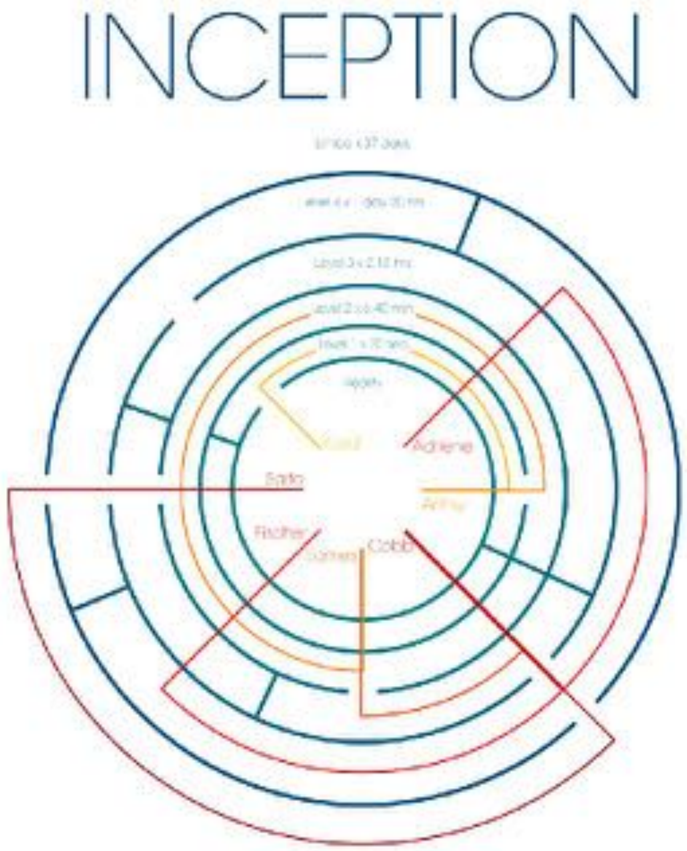
Die Deep Minds sind da

Schawinski+17

Die “Simulatioshypothese”

Bostrom, others

credit: TheVerge



~100,000 Lichtjahre