Space as Cosmic Laboratory

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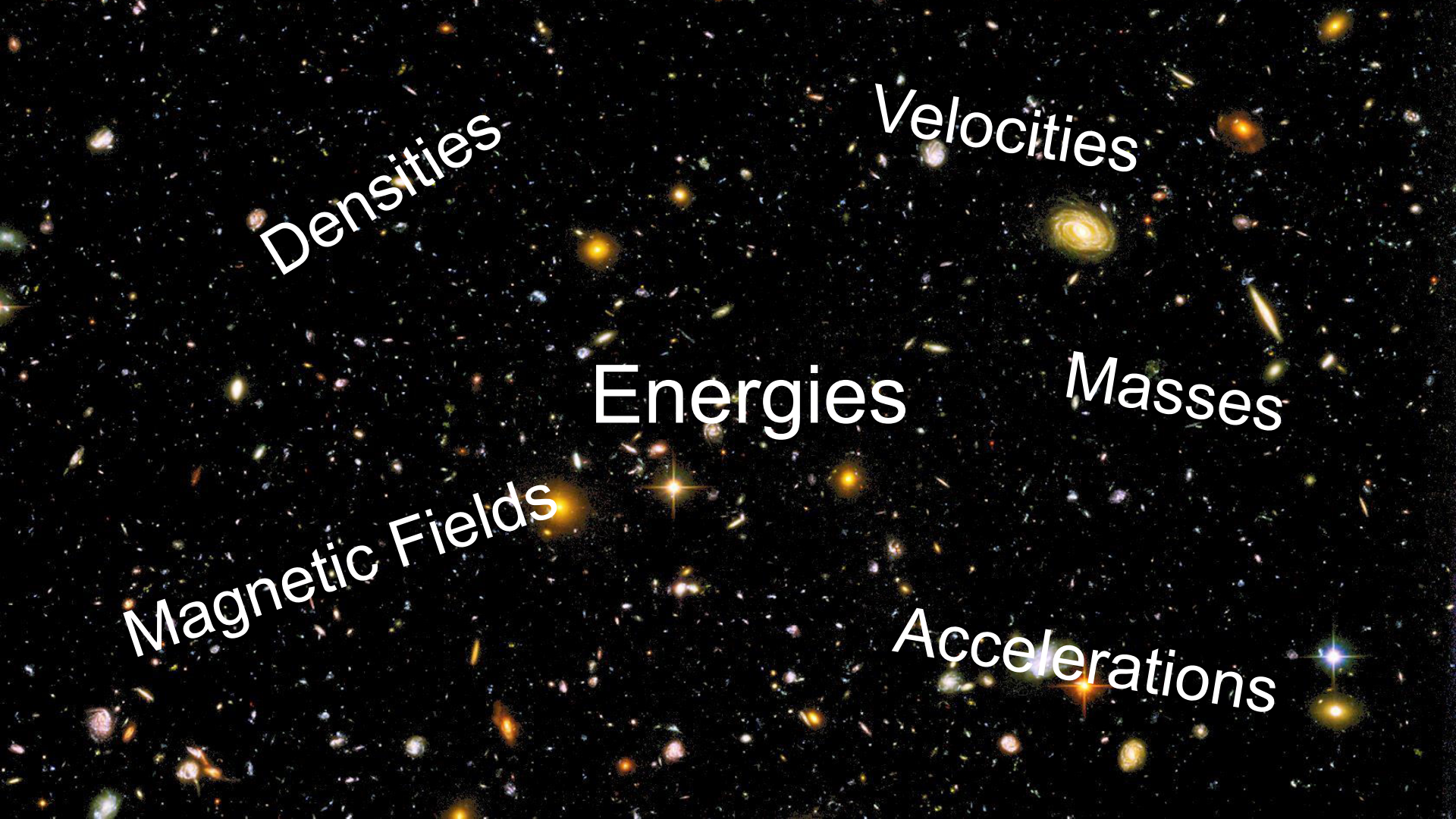
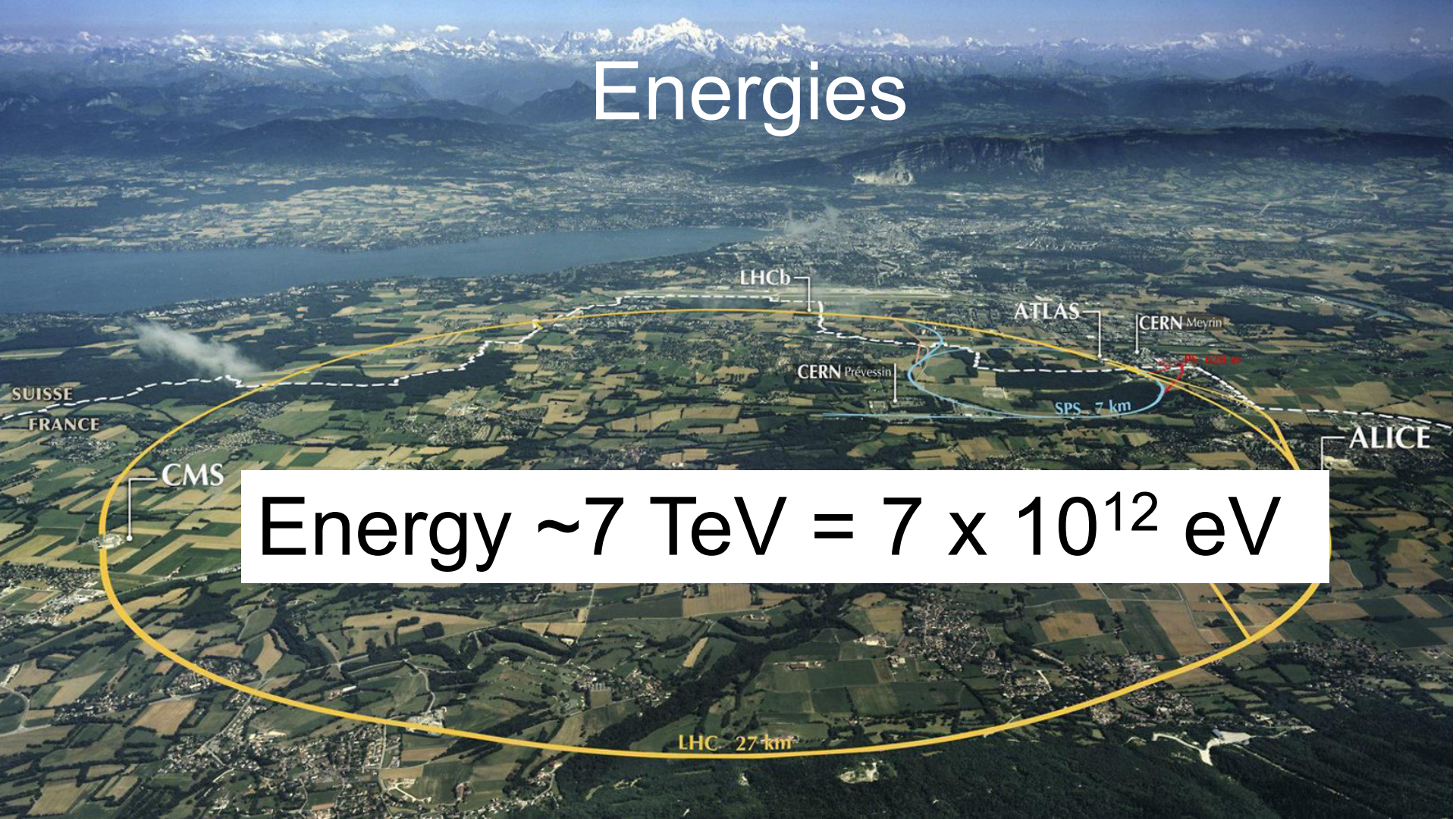
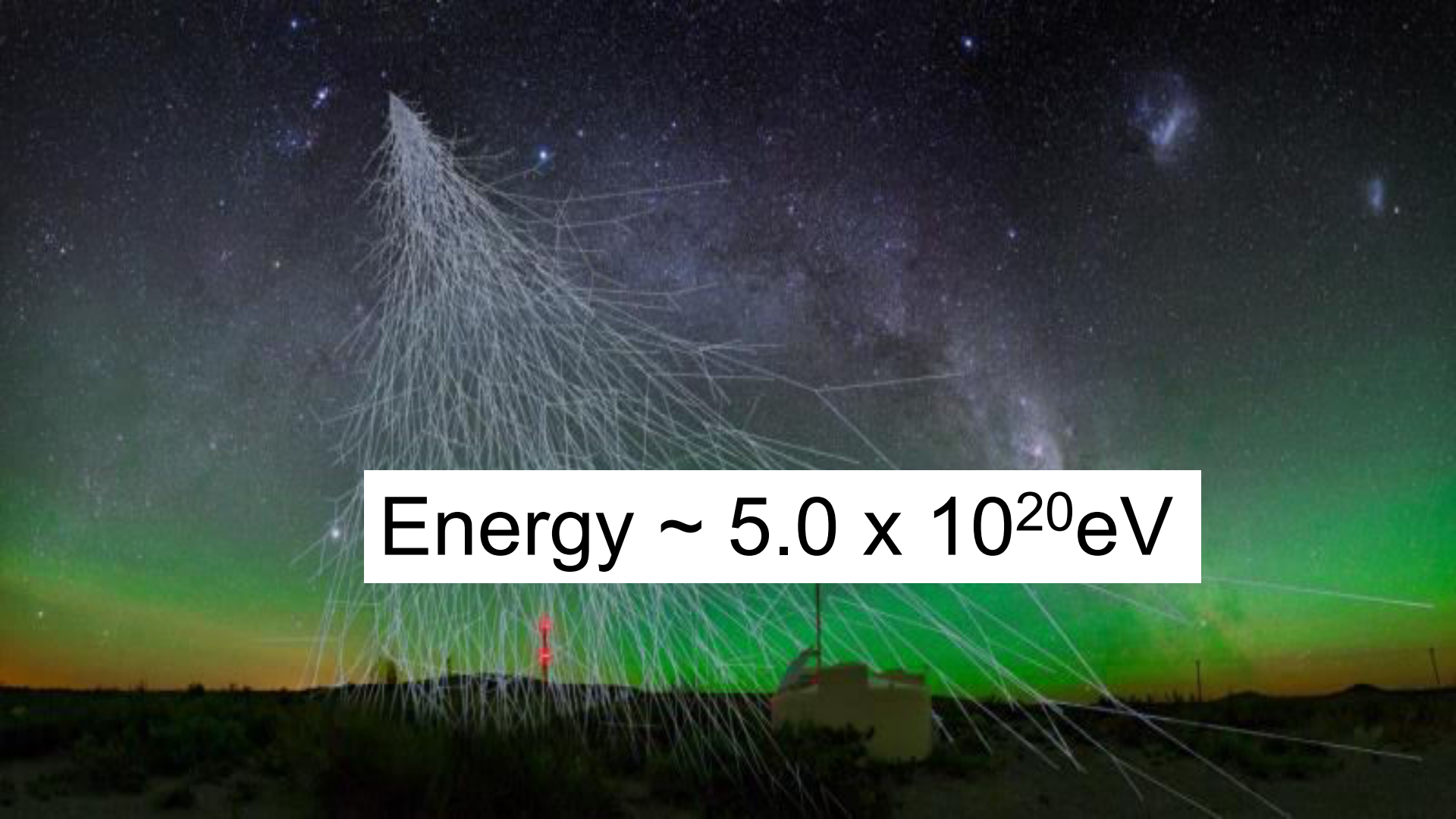

Densities
Velocities
Energies
Masses
Magnetic Fields
Accelerations

Energies



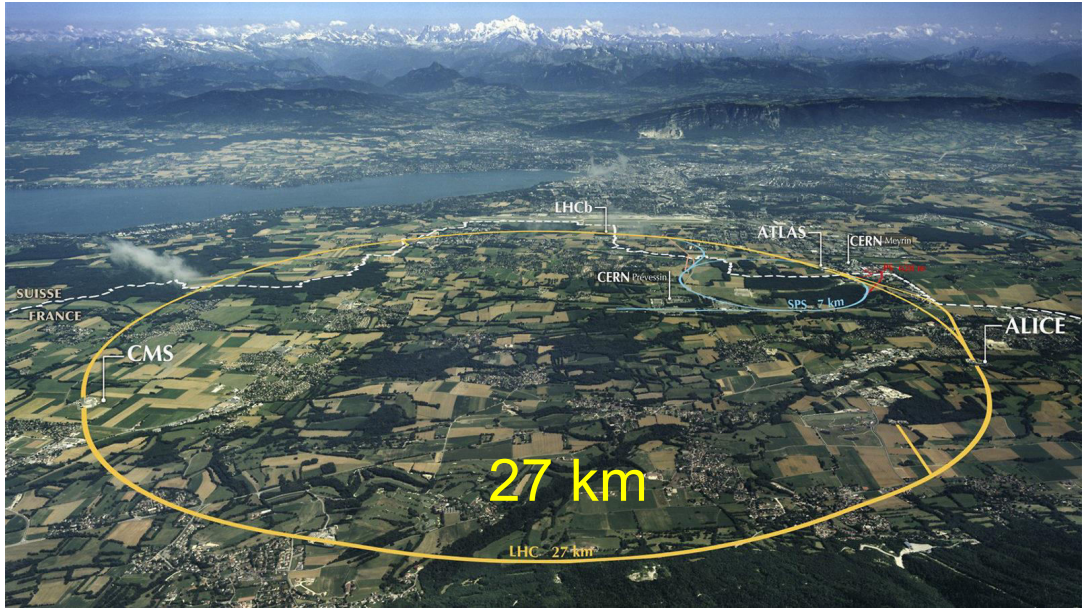
Energy ~7 TeV = 7×10^{12} eV


Energy ~ 5.0 x 10^{20}eV

Earth:7×10^{12} eV

Space: 5×10^{20} eV

8 orders of magnitude



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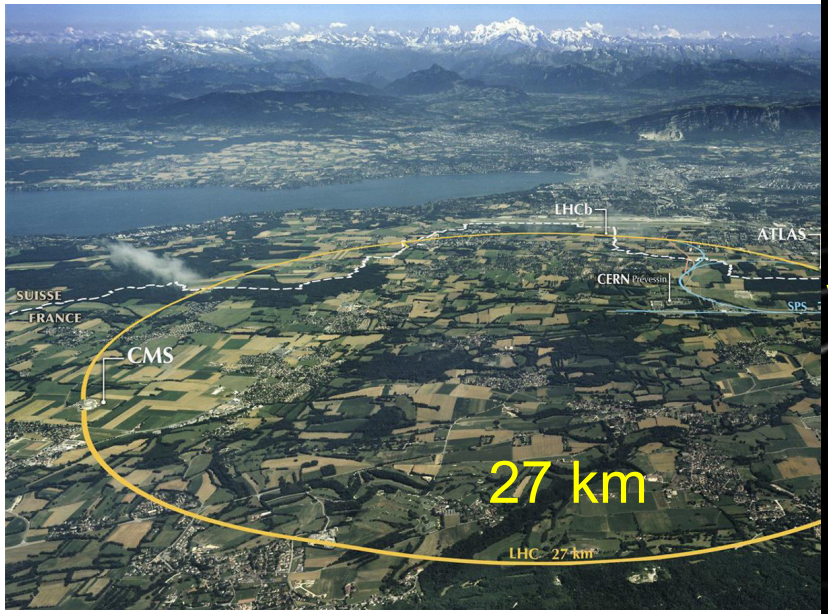

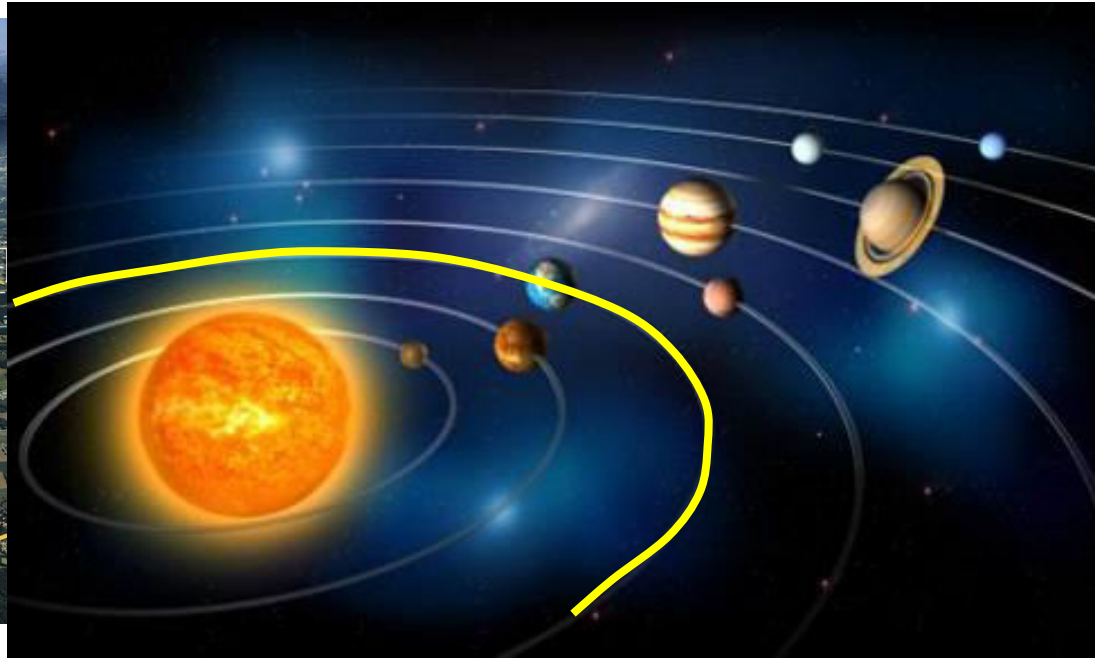

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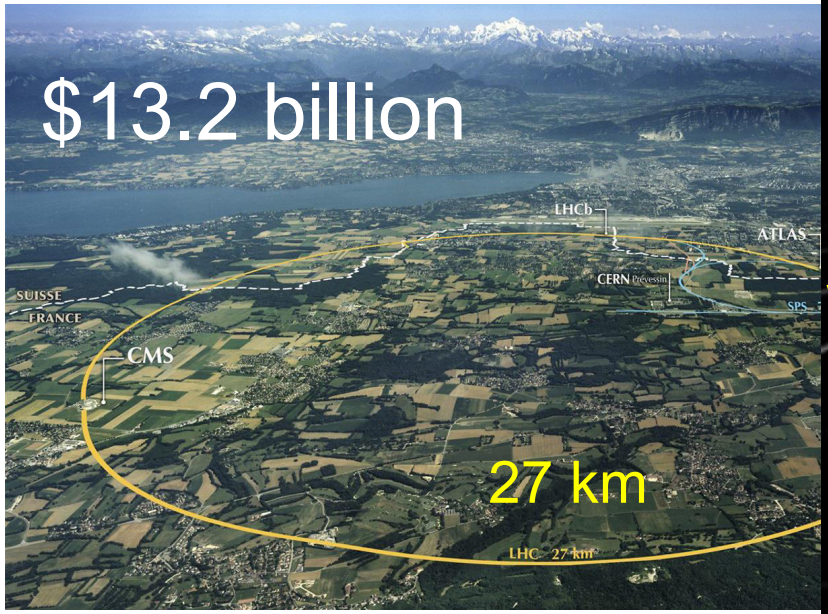
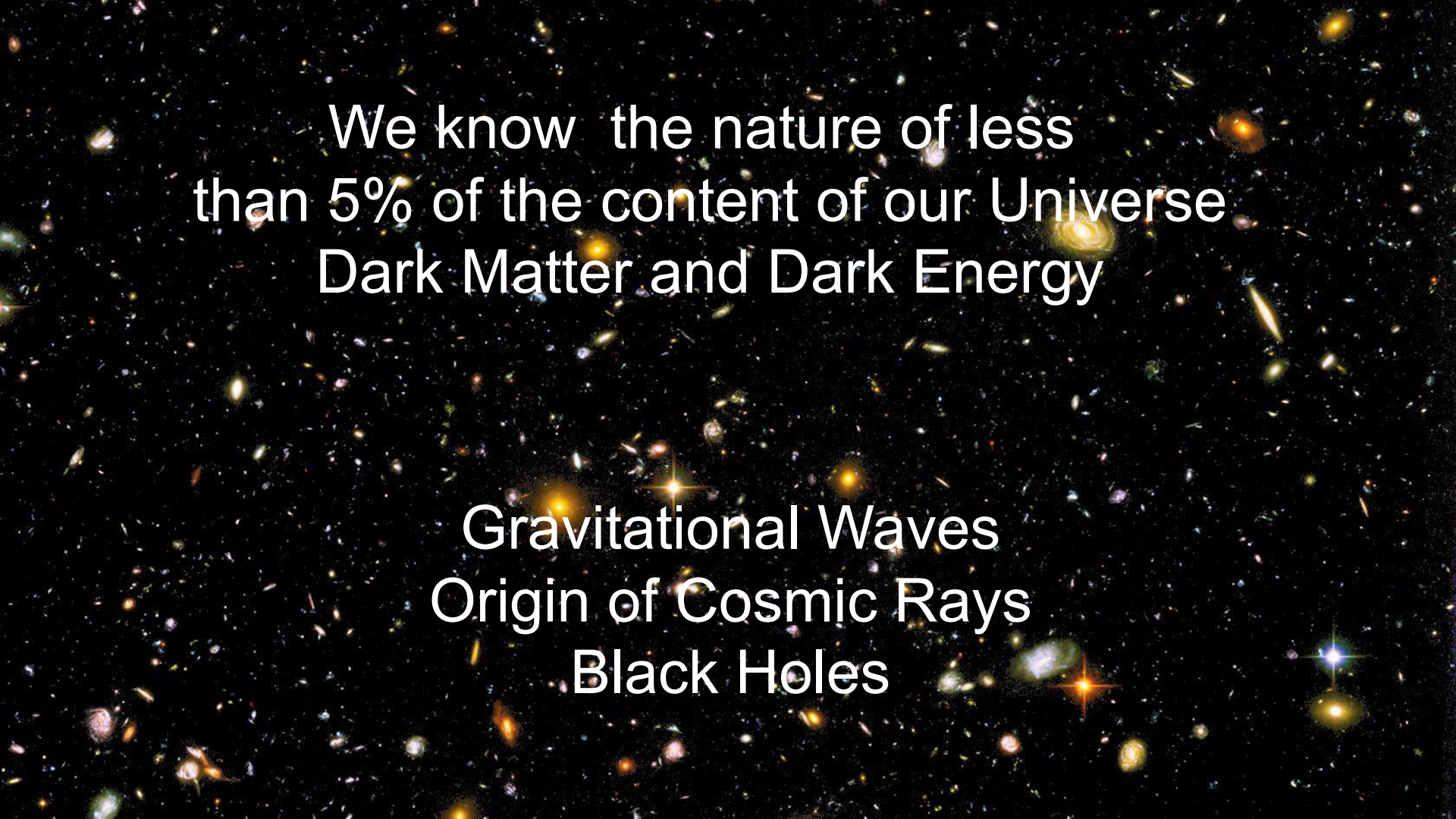
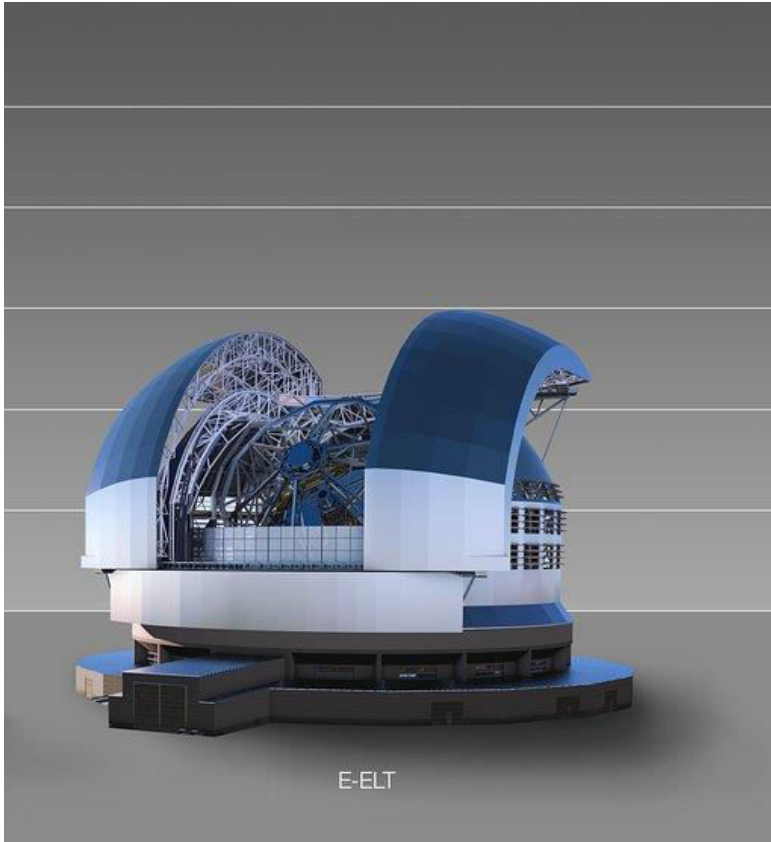



Densities
Velocities
Basic Research should
be at the core of space
exploration/exploitation
Energies
Masses
Magnetic Fields
Accelerations

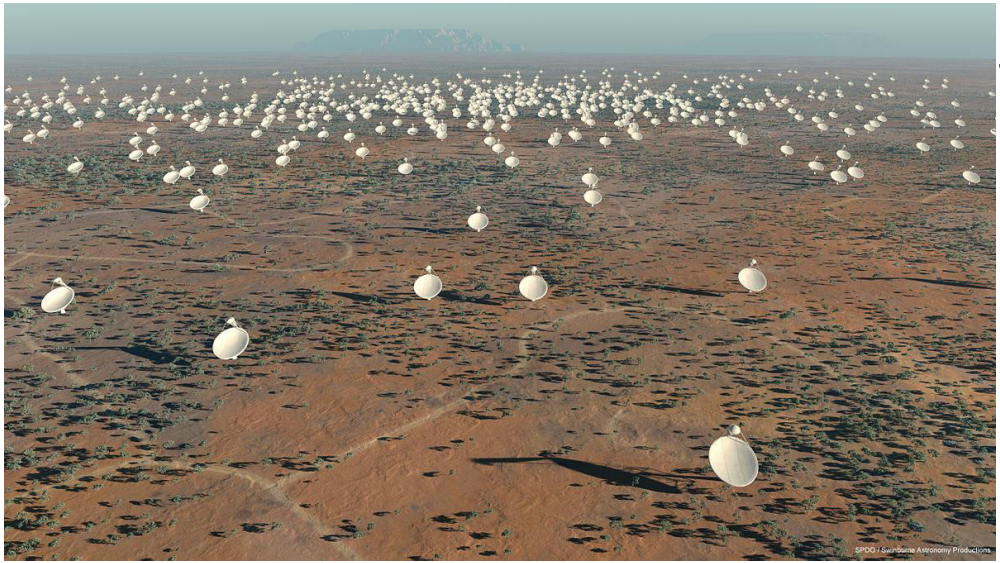

Basic Research should
be at the core of space
exploration/exploitation
Ignorance is NOT a blessing!


We know the nature of less
than 5% of the content of our Universe
Dark Matter and Dark Energy
Gravitational Waves
Origin of Cosmic Rays
Black Holes

Extreme Technological Challenges



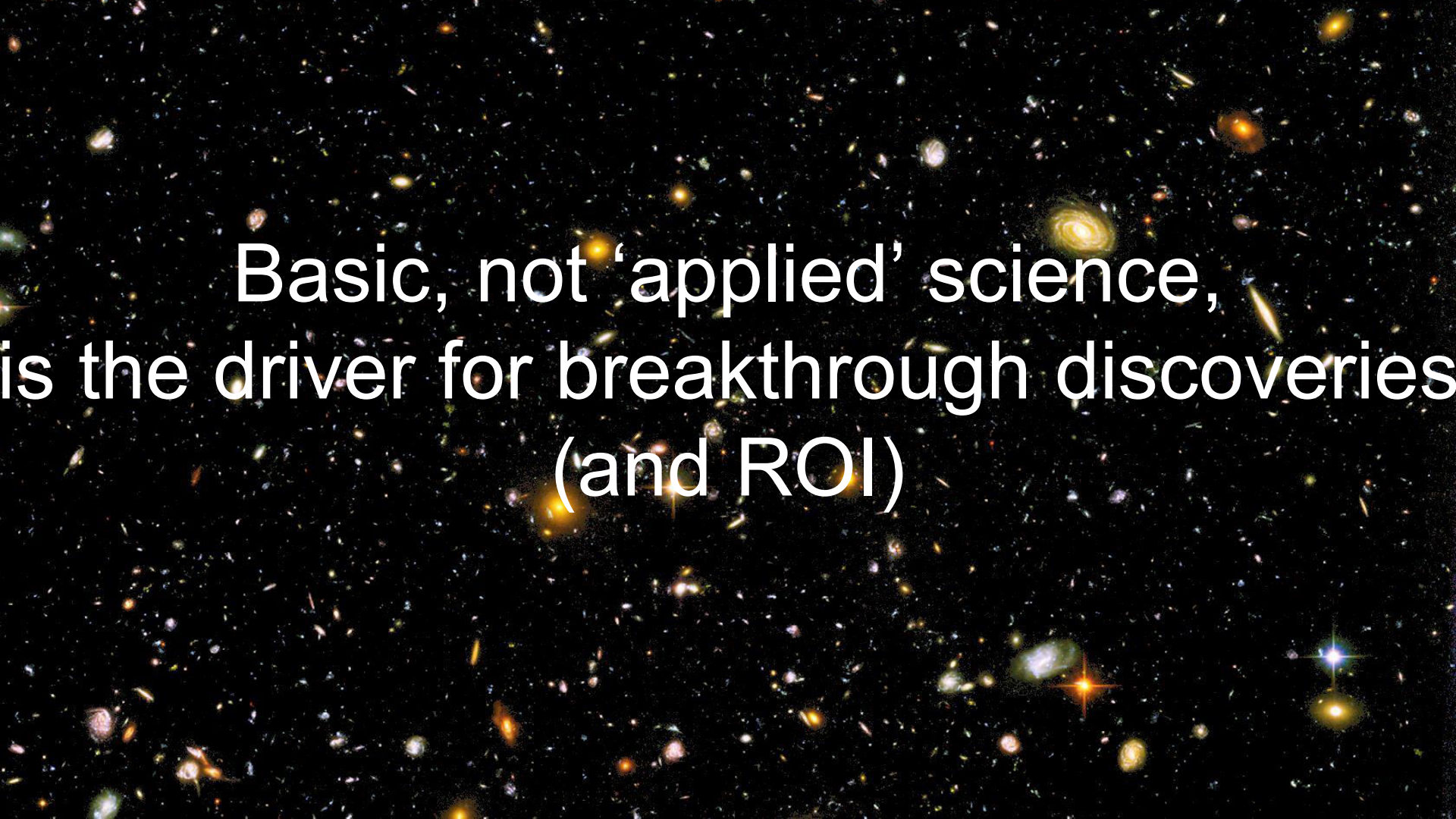
Extreme Technological Challenges

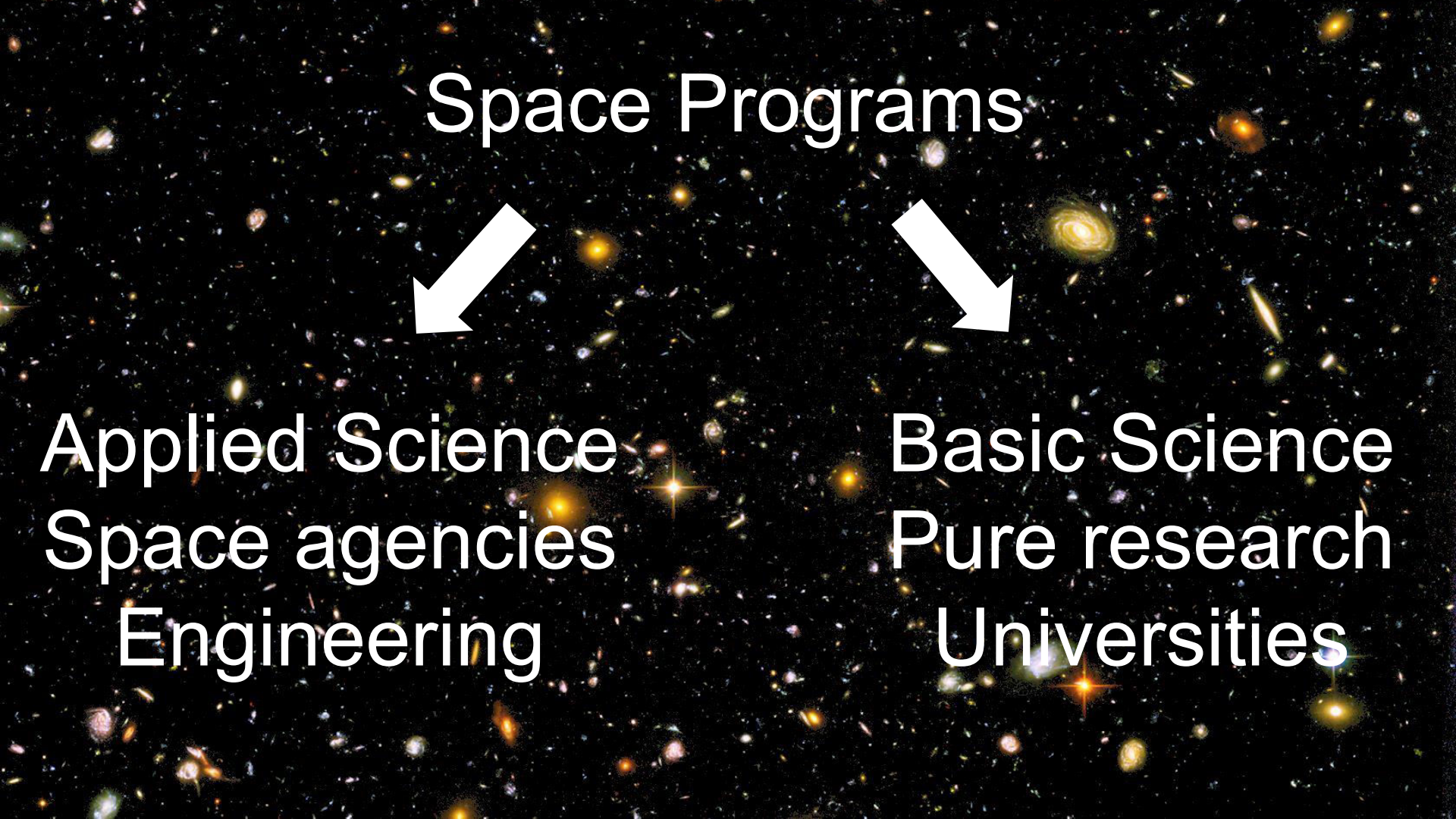


Square Kilometer Array (SKA)
Australia & South Africa

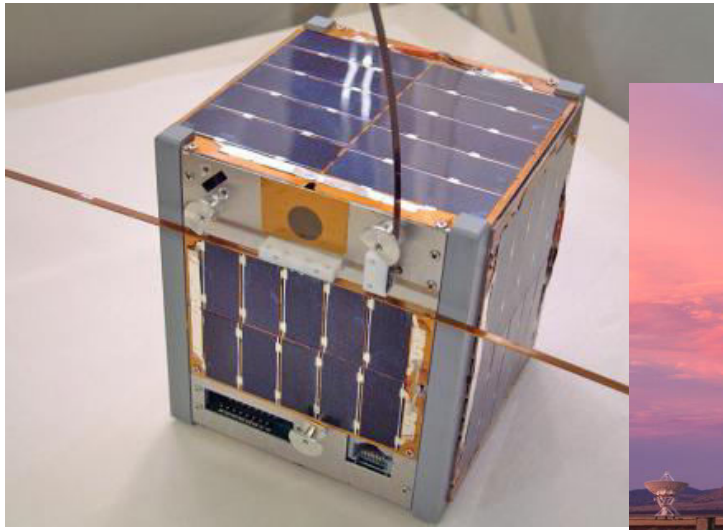
SKA will generate 160 TByte of data per second (35,000 DVD per second)

Larger than current traffic of ***ALL*** internet per second (50 TByte/sec)


Basic, not ‘applied’ science,
is the driver for breakthrough discoveries
(and ROI)


Space Programs
Applied Science
Space agencies
Engineering
Basic Science
Pure research
Universities

New York University Abu Dhabi



CubeSat
MBRSC & UAESA

Large observational facilities

Galaxies & Black Holes

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NYU ABU DHABI

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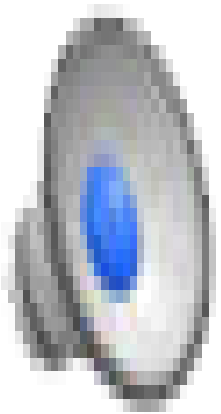
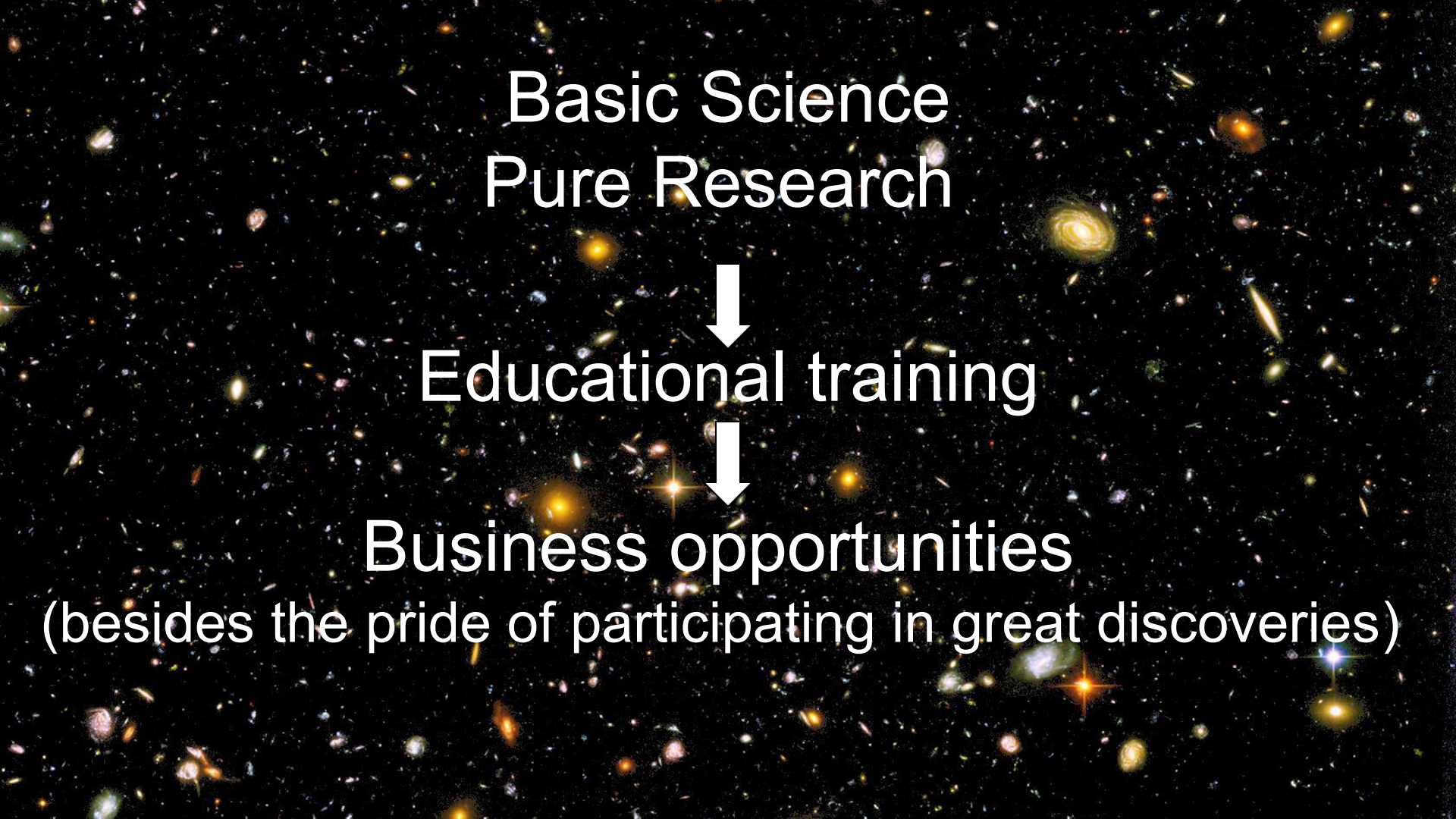
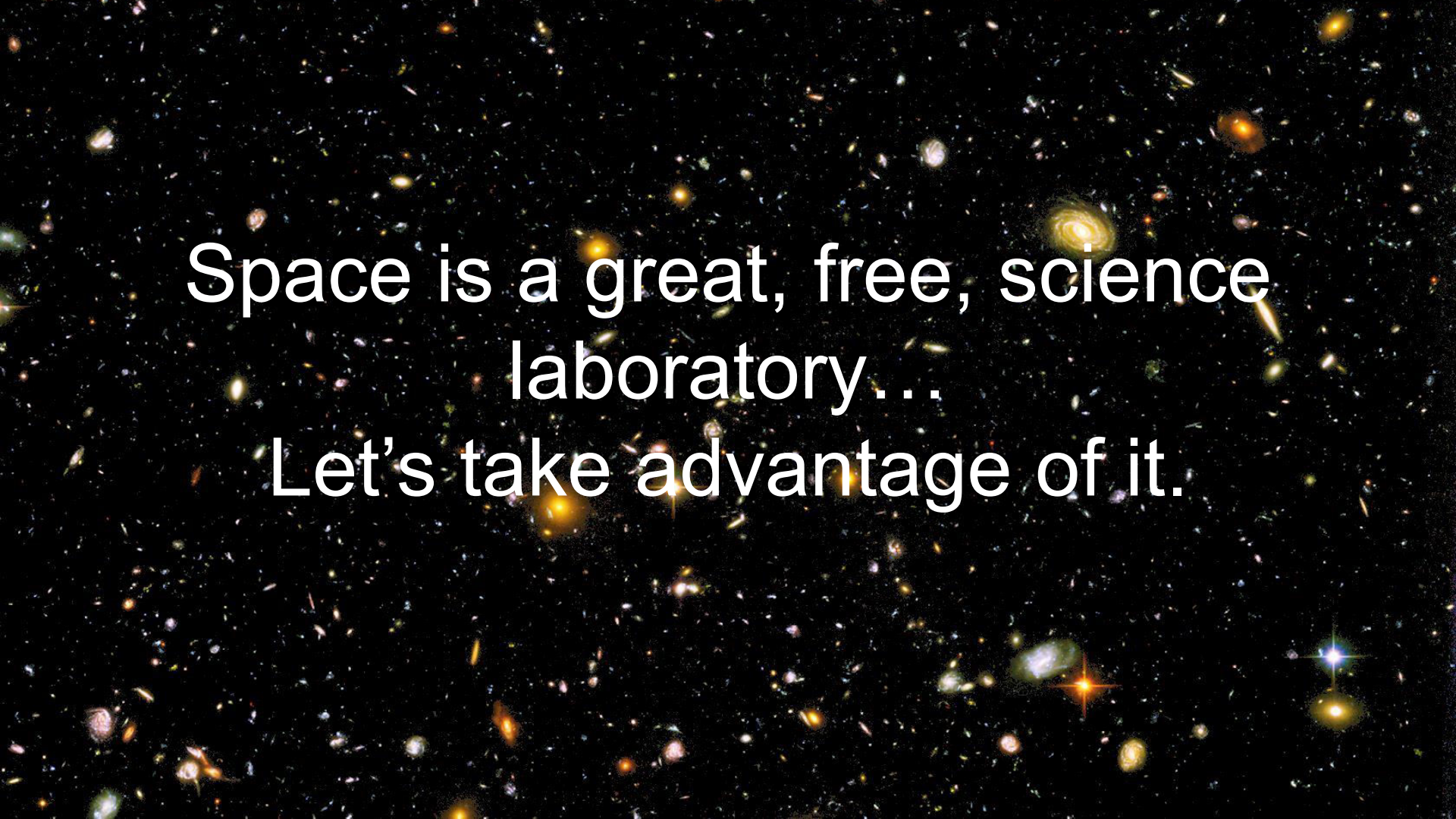
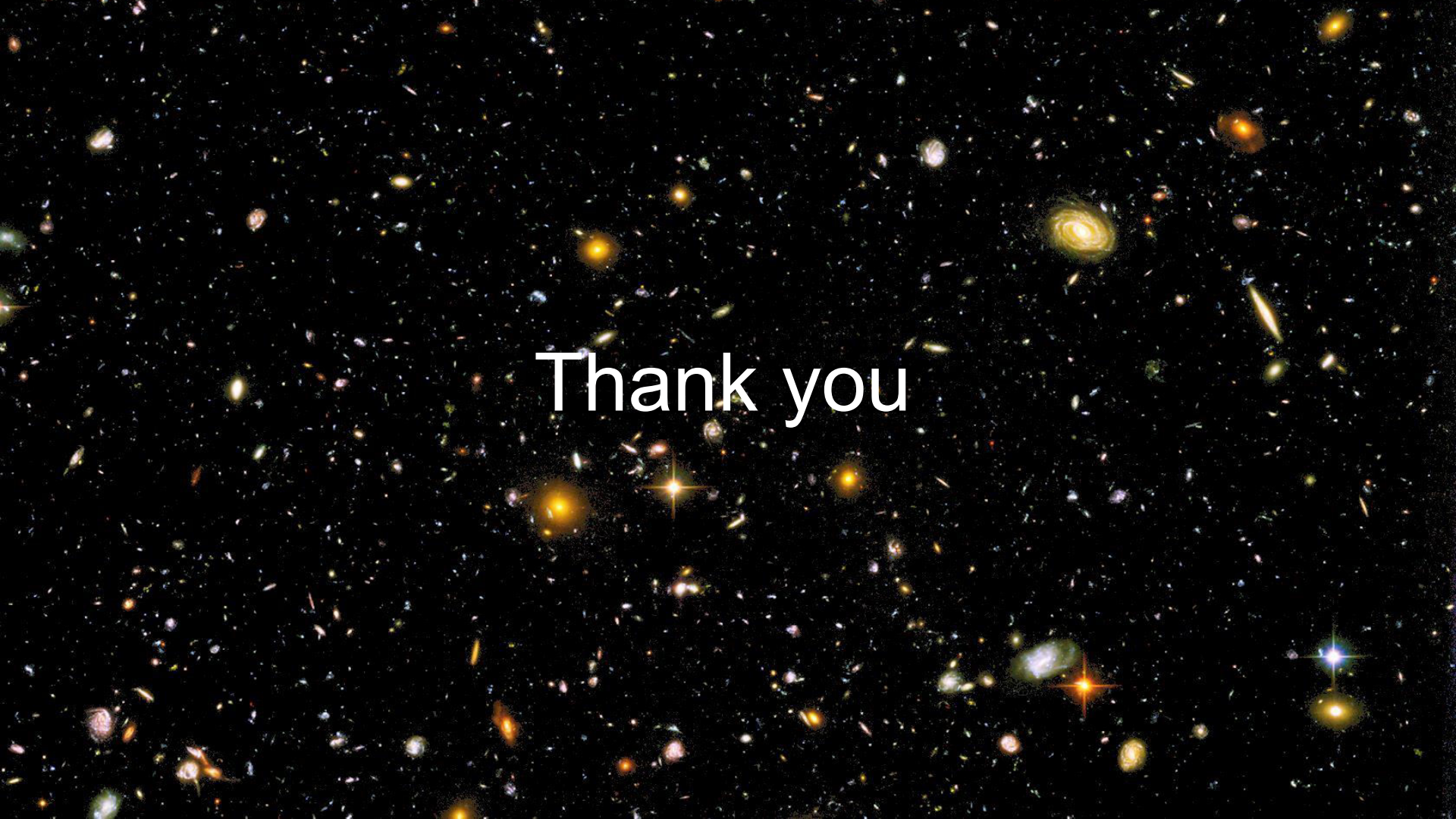
Galaxy in the making
Gas Temperature (Red=hot, Blue=cold)

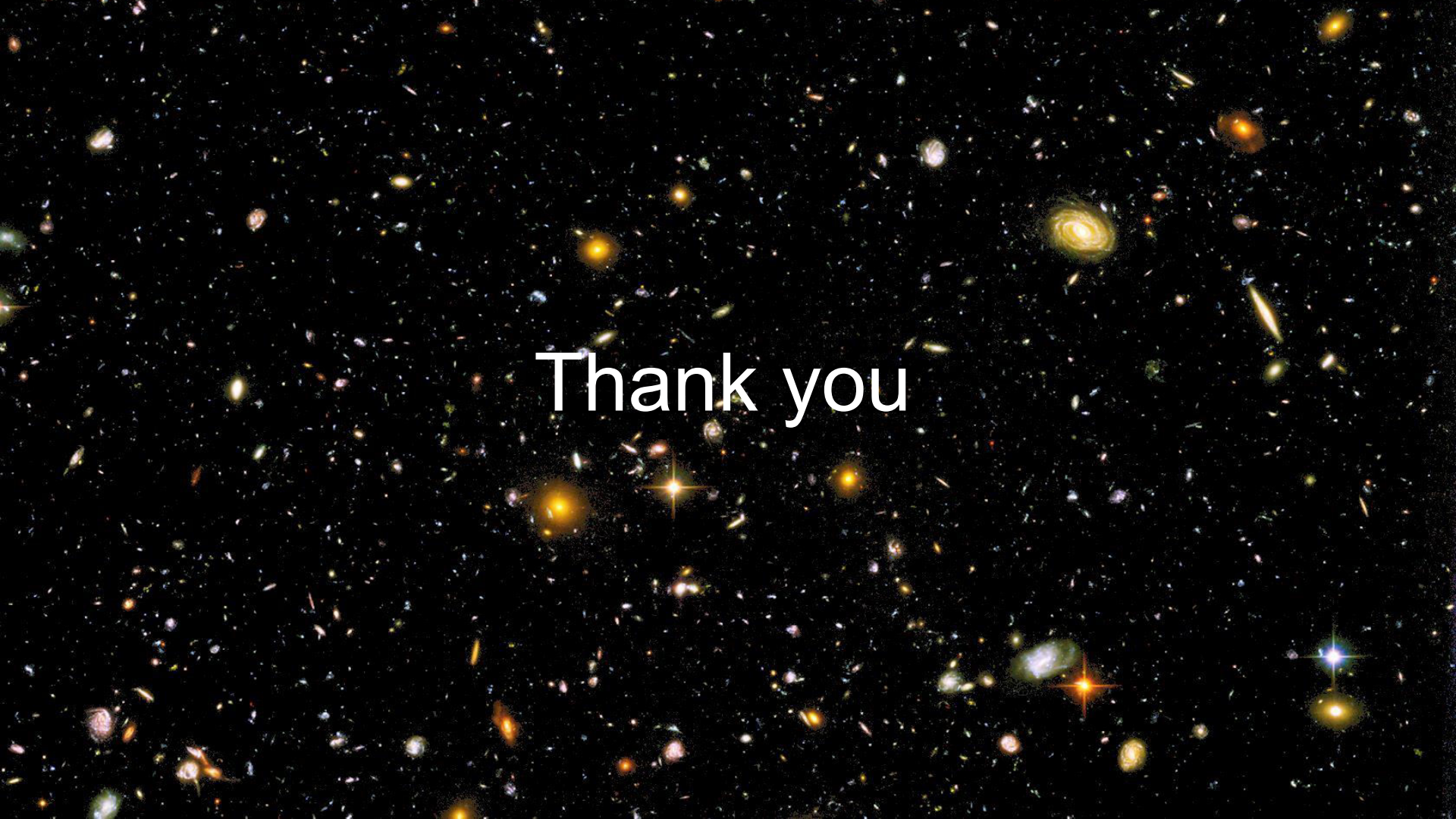


Galaxy today


Basic Science
Pure Research
Educational training
Business opportunities
(besides the pride of participating in great discoveries)


Space is a great, free, science laboratory…
Let’s take advantage of it.


Thank you


Thank you