CERN Quantum Technology Initiative

QUANTUM
TECHNOLOGY
INITIATIVE

Sofia Vallecorsa

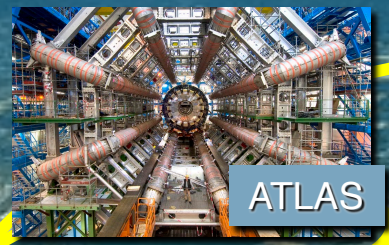
AI and Quantum Research - CERN IT

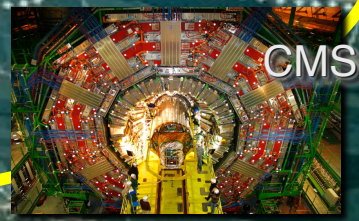
CERN

CERN

International organisation for fundamental research in particle physics

- 23 member states,
- 1.2 B CHF budget
- > 3000 staff, fellows, apprentices, …
- > 13000 associates





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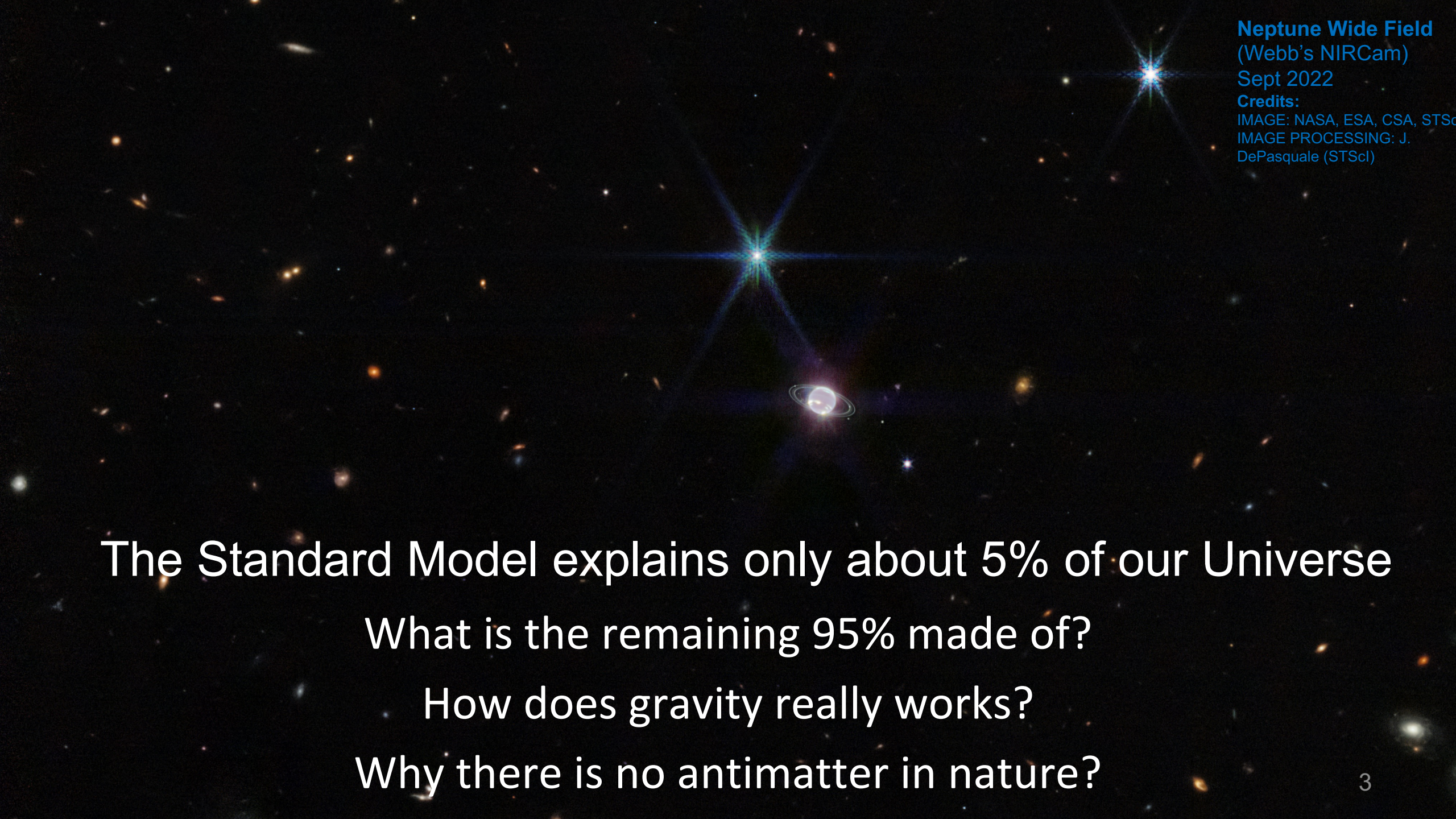

The Standard Model explains only about 5% of our Universe

What is the remaining 95% made of?

How does gravity really works?

Why there is no antimatter in nature?

Quantum Revolutions

Now

2002

Second Quantum Revolution

Use quantum mechanics principles to develop new technology

"Artificial" quantum states

1900

First Quantum Revolution

Max Planck black-body radiation paper

Particle-Wave duality

Transistor, laser, atomic clock, computers, optical fibre communication, GPS system

QUANTUM TECHNOLOGY:
THE SECOND QUANTUM REVOLUTION.

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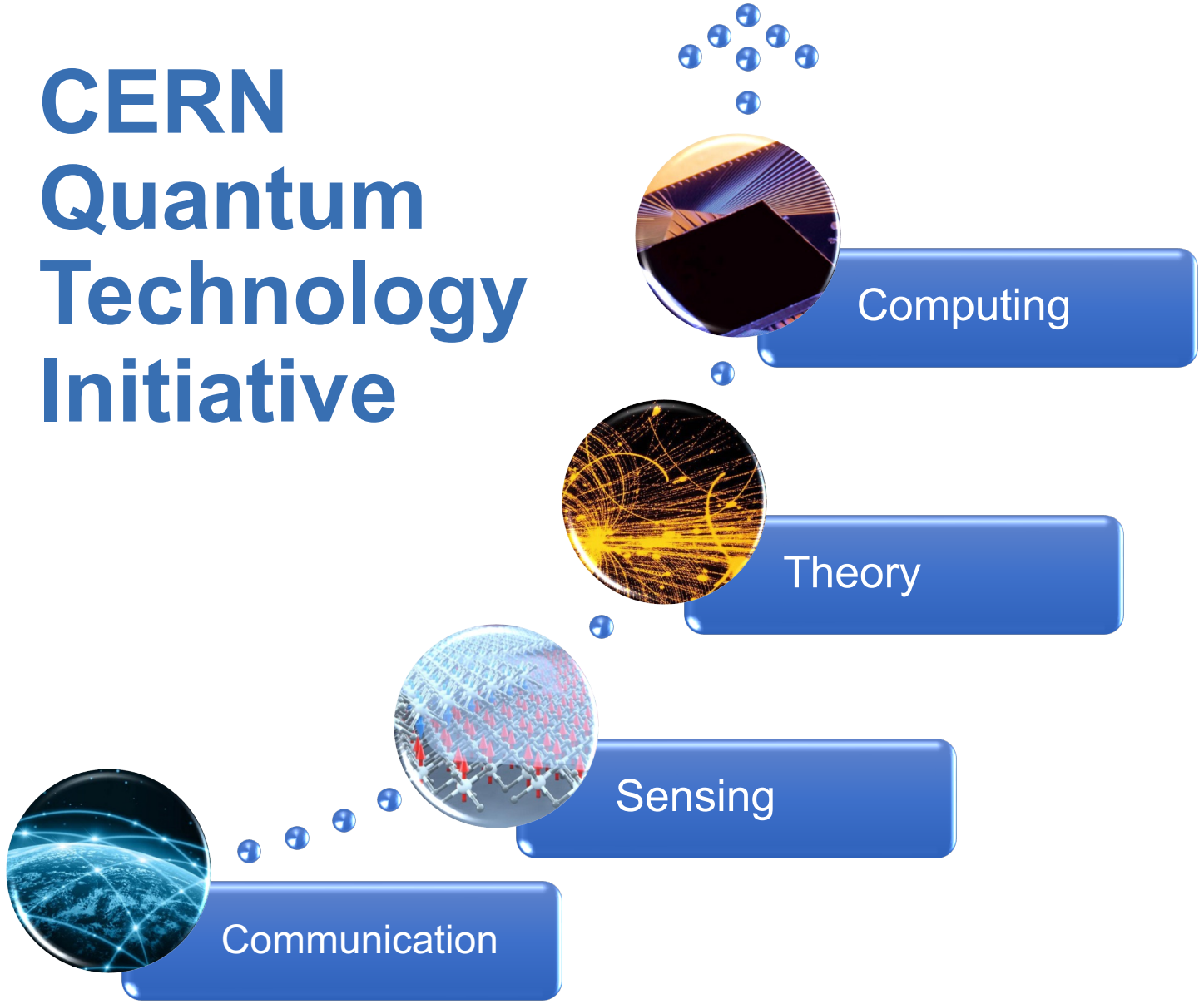
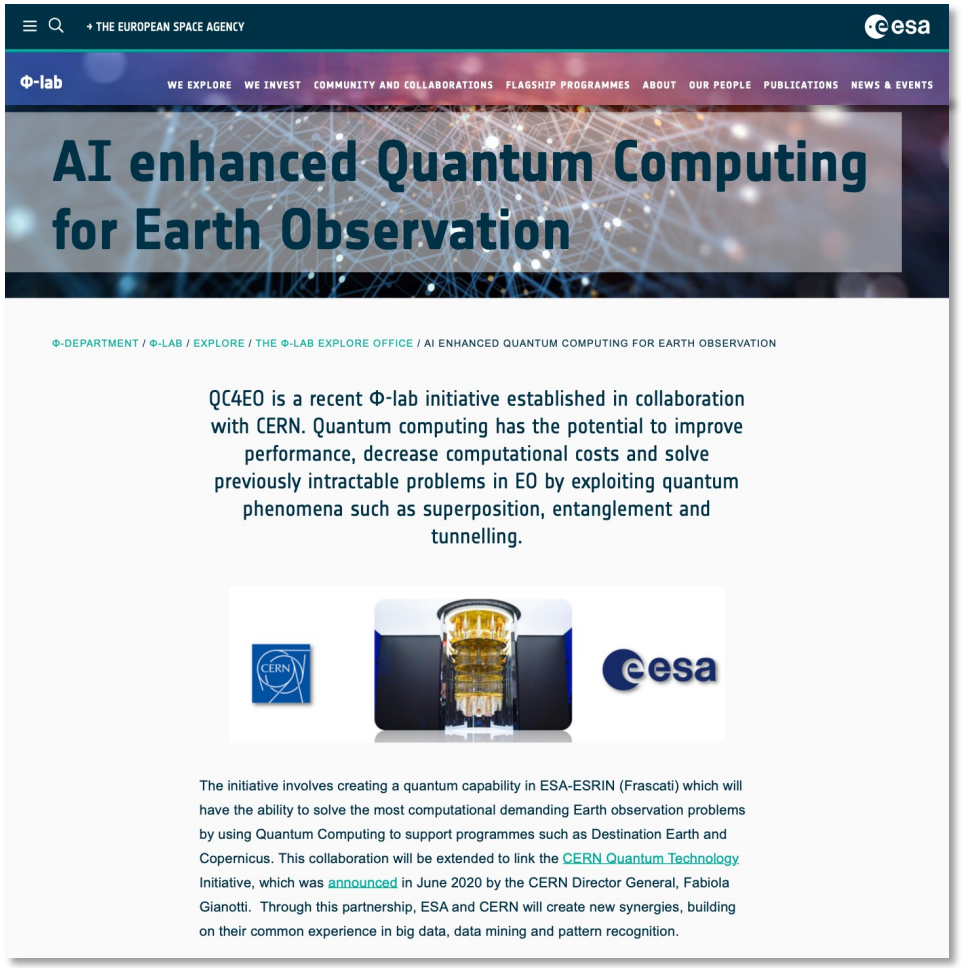


- What **realistic applications** profit from quantum technologies?
  - **Representative use cases**
  - Understand **challenges and limitations** (on NISQ and fault tolerant hardware)
  - **Optimize** quantum algorithms
- Focus on **practical advantage**
- **Collaboration** with industry and other sciences

2021 CERN QTI Roadmap: https://doi.org/10.5281/zenodo.5553774

The ESA-CERN Joint Announcement at Phi-Week 2020

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