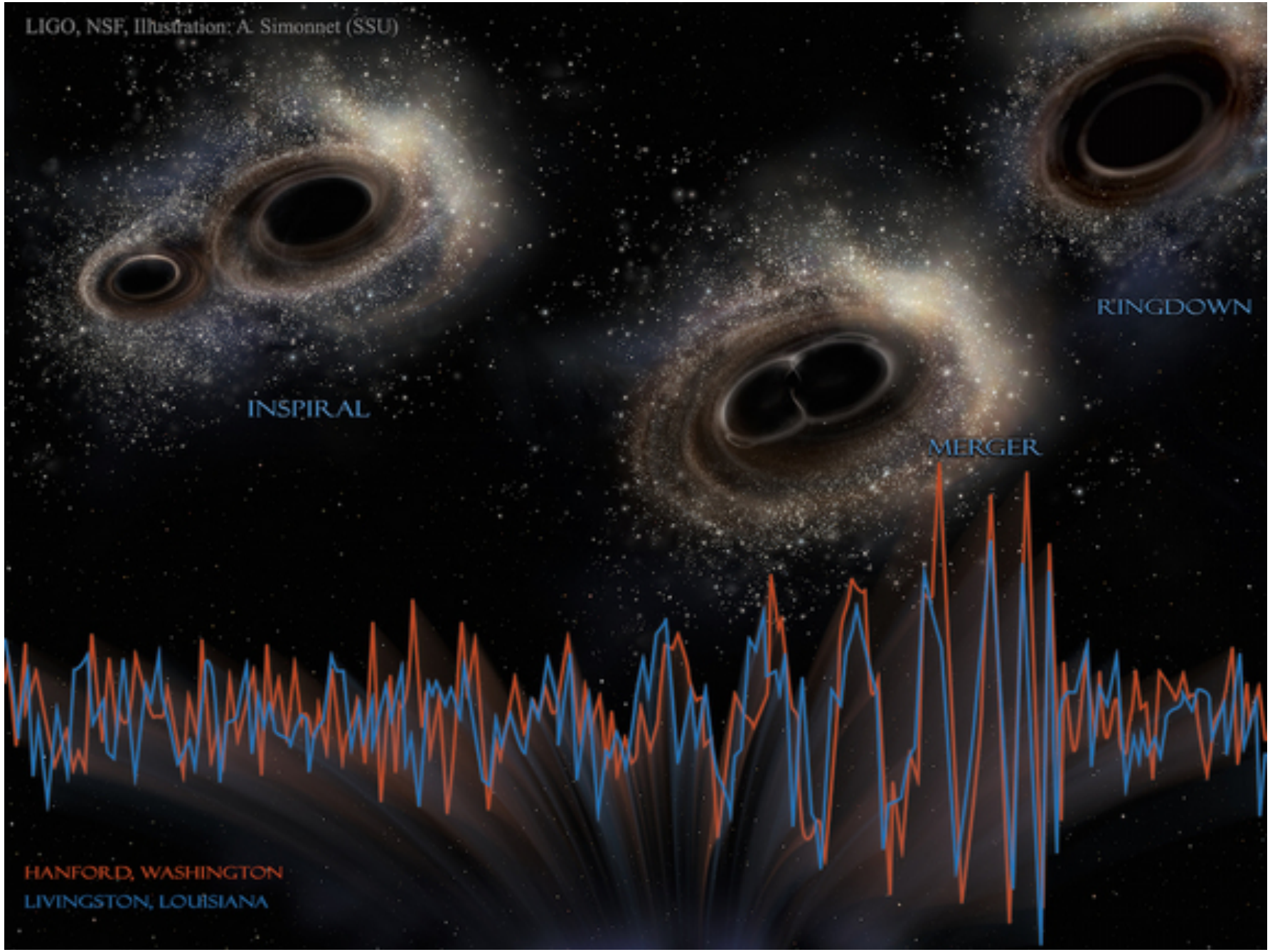
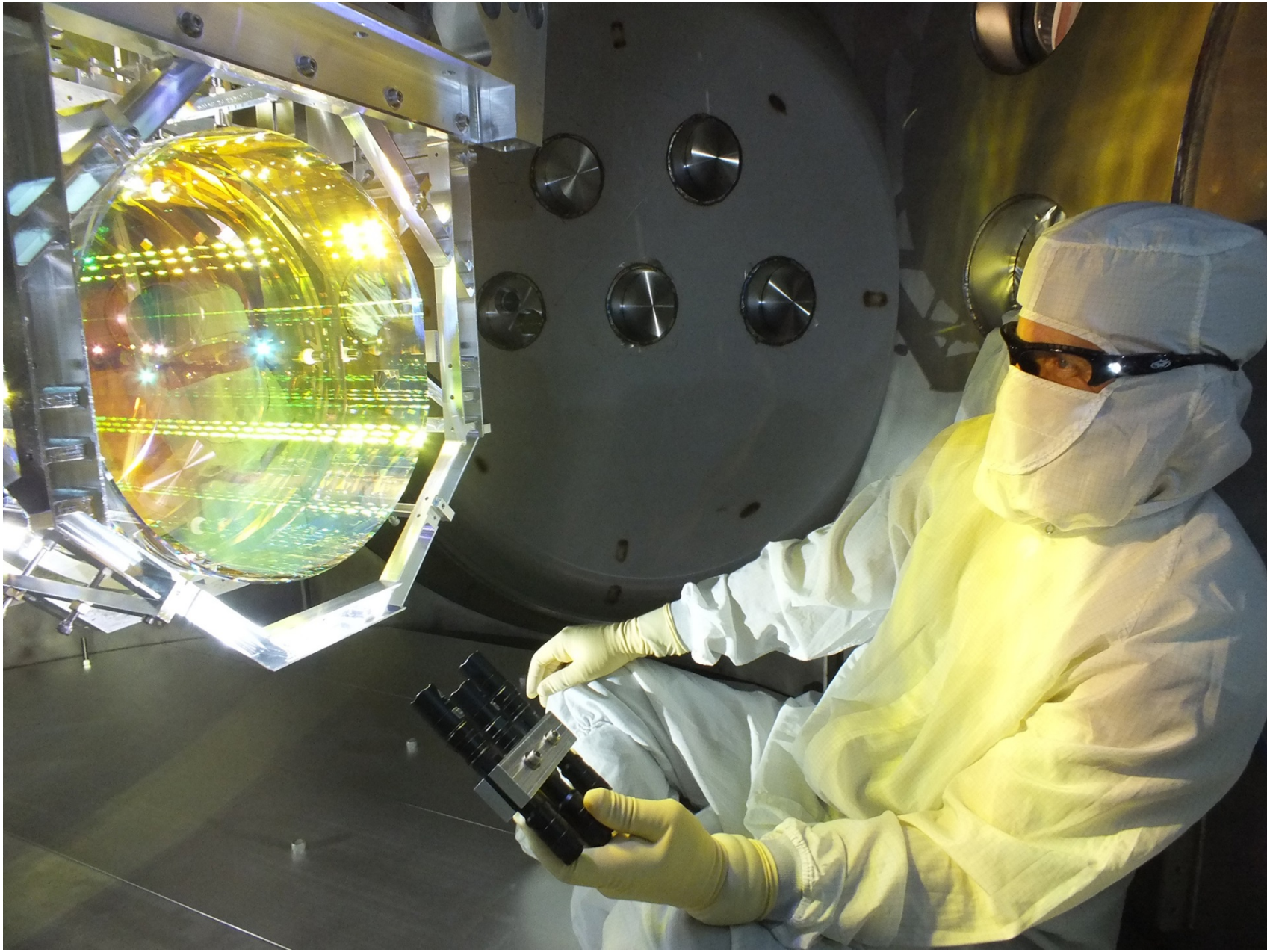
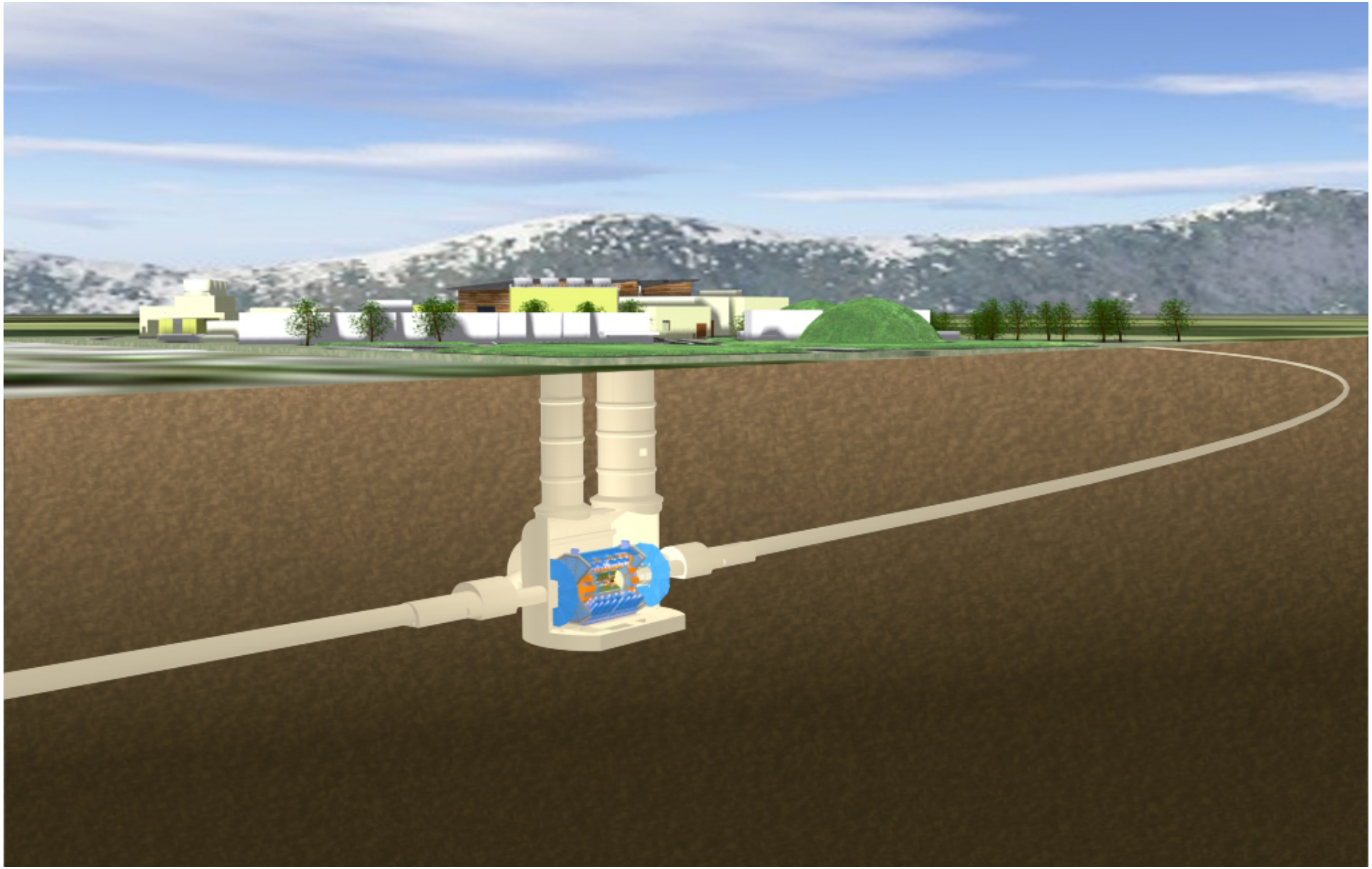

Epigenetica
Una nuova prospettiva
Kristian Pscicchia
Catalina Curceanu
LNF-INFN, 27 giugno 2016


LIGO, NSF, Illustration: A. Simonnet (SSU)
INSPIRAL
MERGER
RINGDOWN
HANFORD, WASHINGTON
LIVINGSTON, LOUISIANA



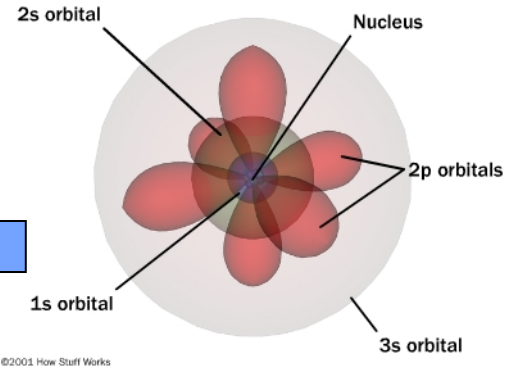


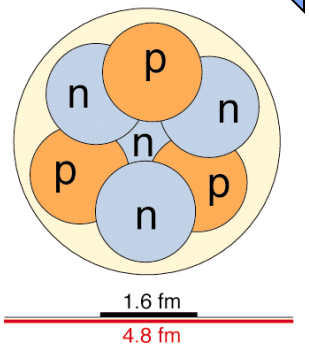
L'atomo all'inizio del '900

L'atomo di Thompson

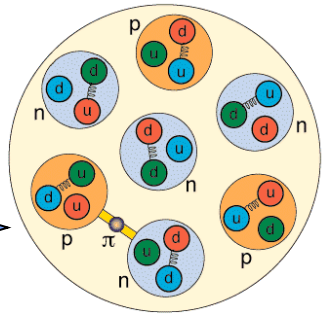
L'atomo di Rutherford e Bohr

L'atomo quantistico




La struttura del nucleo



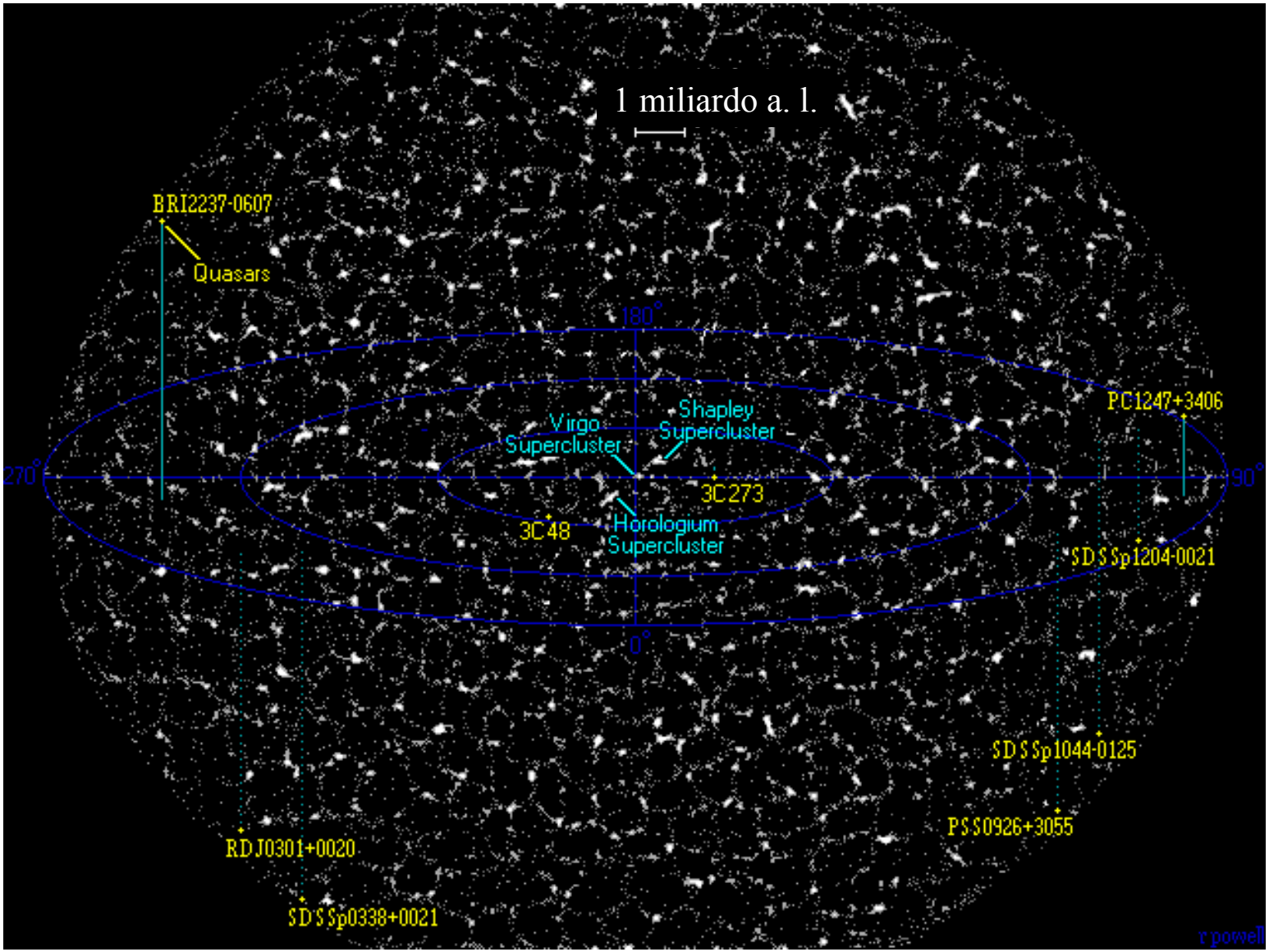

Il nucleo oggi

# The Standard Model

| | | | | | |
|---|---|---|---|---|---|
| | | Fermions | | Bosons | |
| Quarks | u up | c charm | t top | g gluone | Force carriers |
| | d down | s strange | b bottom | γ fotone | |
| Leptons | $\nu_e$ e-neutrino | $\nu_\mu$ μ-neutrino | $\nu_\tau$ τ-neutrino | W bosone | |
| | e elettrone | μ muone | τ tau | Z bosone | |
| | I | II | III | Higgs Boson | |
| | Families of matter | | | | |

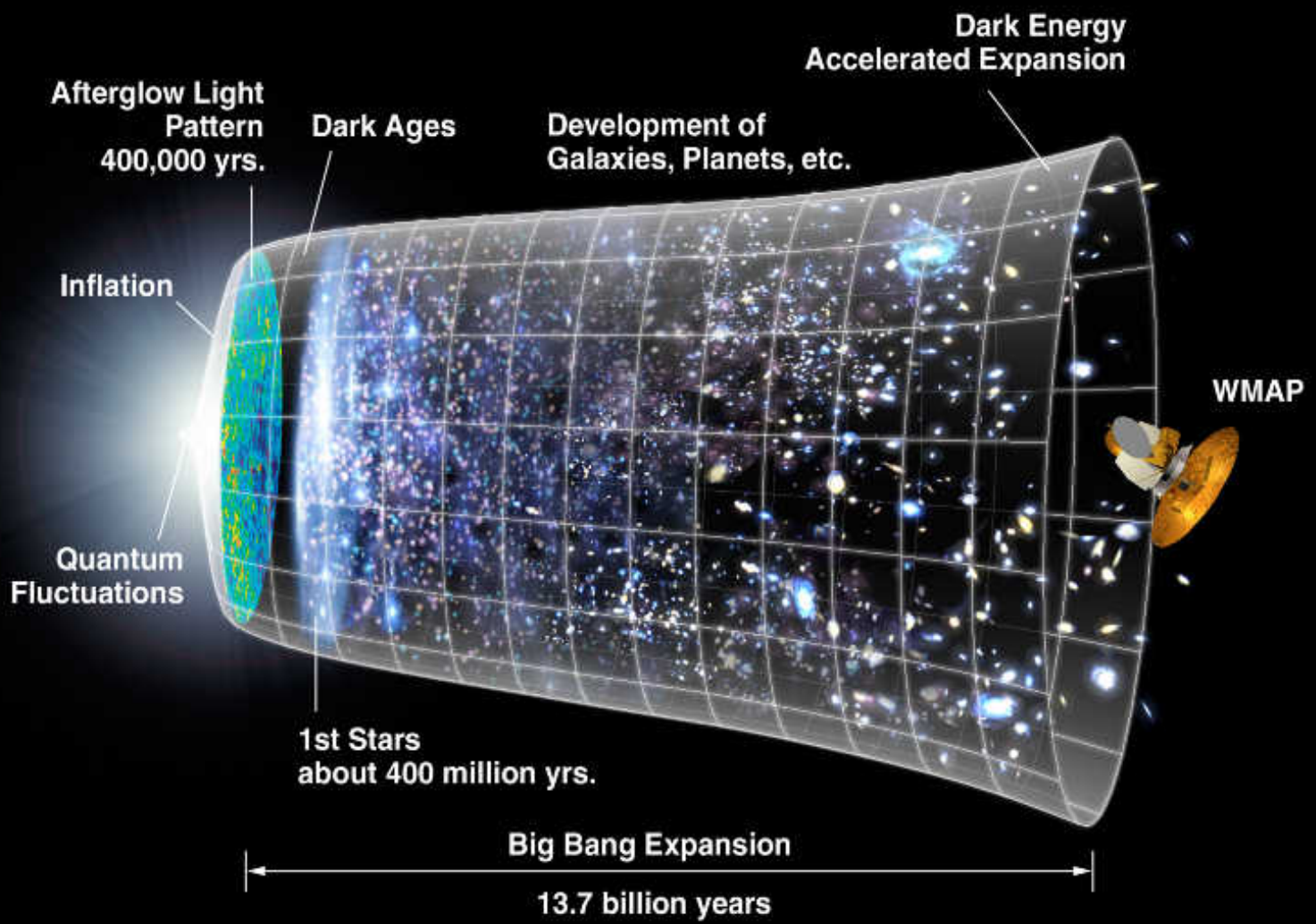
Gravity

The… "opera Ghost"


1 miliardo a. l.
BRI2237-0607
Quasars
180°
270°
90°
0°
Virgo
Supercluster
Shapley
Supercluster
3C273
3C48
Horologium
Supercluster
PC1247+3406
SDSSp1204-0021
SDSSp1044-0125
PSS0926+3055
RDJ0301+0020
SDSSp0338+0021
r powell

Zoom In x15

# The Big Bang Model



# *Istituto Nazionale di Fisica Nucleare*

L'INFN

- promuove, coordina ed effettua la ricerca scientifica nel campo della fisica sub-nucleare, nucleare e astroparticellare,
- nonche' la ricerca e lo sviluppo tecnologico necessari alle attivita' in tali settori,
- in stretta connessione con l'Universita'
- e nel contesto della collaborazione e del confronto internazionale.

# 1951

## 4 Sezioni universitarie

Milano, Torino, Padova, e Roma

# 1957

## Laboratori Nazionali di Frascati

**Frascati**

INFN
Istituto Nazionale di Fisica Nucleare

Legnaro

VIRGO-EGO

European

Gravitational

Observatory

Laboratori del Sud (Catania)

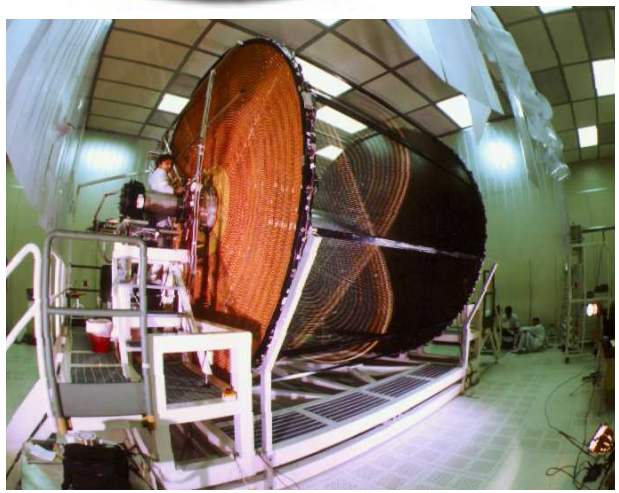

Gran Sasso

19 Sezioni

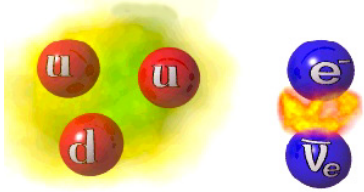
11 Gruppi collegati

4 Laboratori Nazionali

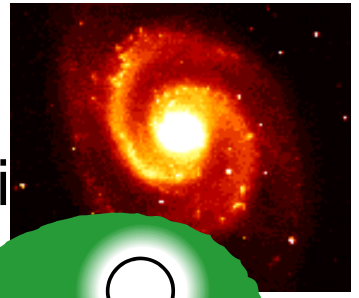
# *Che cosa si fa ai Laboratori Nazionali di Frascati?*



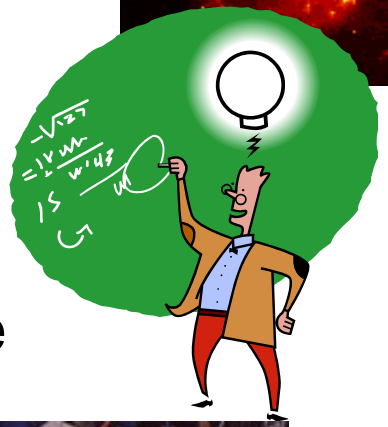
Ricerca fondamentale



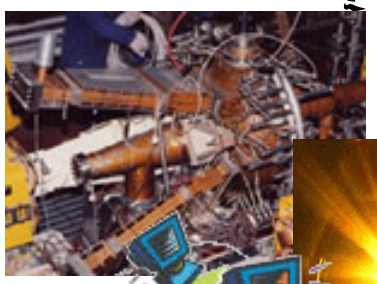

- Studi sulla struttura intima della materia
- Ricerca di onde gravitazionali



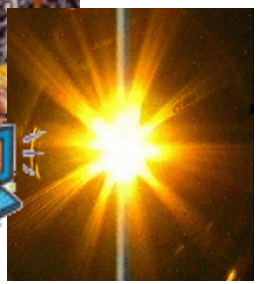
- Elaborazione di modelli teorici



- Sviluppo e costruzione di rivelatori di particelle
- Studio e sviluppo di tecniche acceleratrici

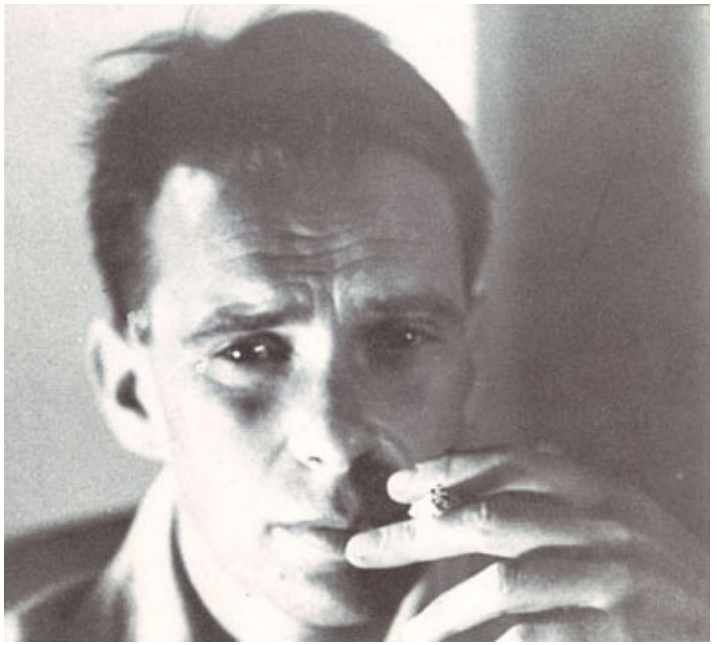


- Studi di materiali e ricerche bio-mediche con luce di sincrotrone

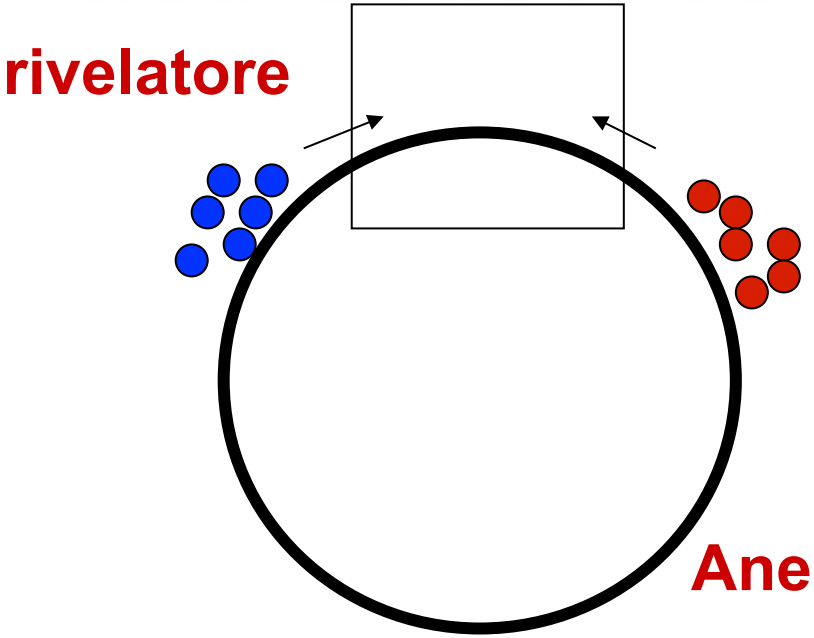


- Sviluppo e supporto di sistemi di calcolo e reti

# *Un nuovo approccio: usare fasci collidenti*

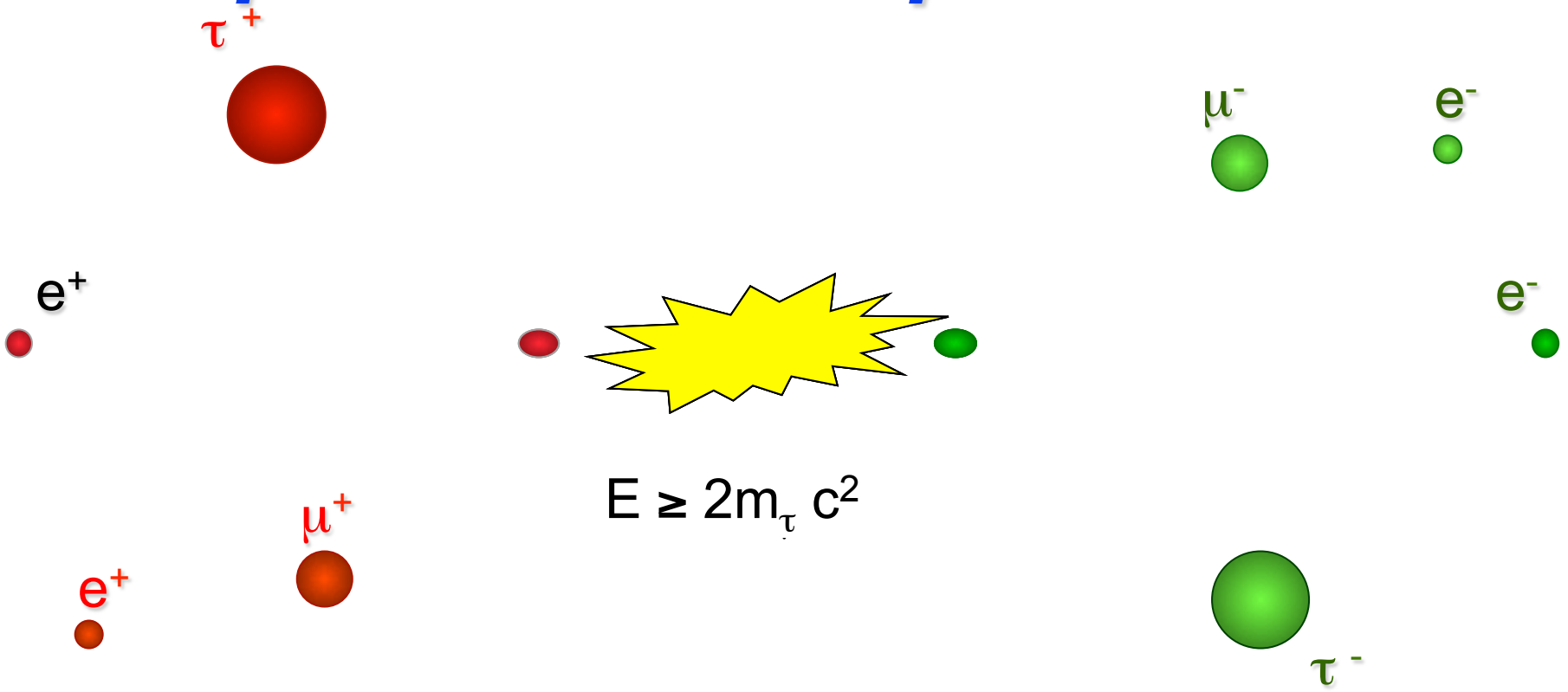


*Bruno Touschek, Frascati, 1960*




- Le particelle che non interagiscono, possono essere riutilizzate al giro successivo
- Collisione nel centro di massa
- Le particelle circolanti possono essere sia elementari che complesse (come nuclei o atomi).

# *Un passo in piu`: Collisione di particelle e antiparticelle*

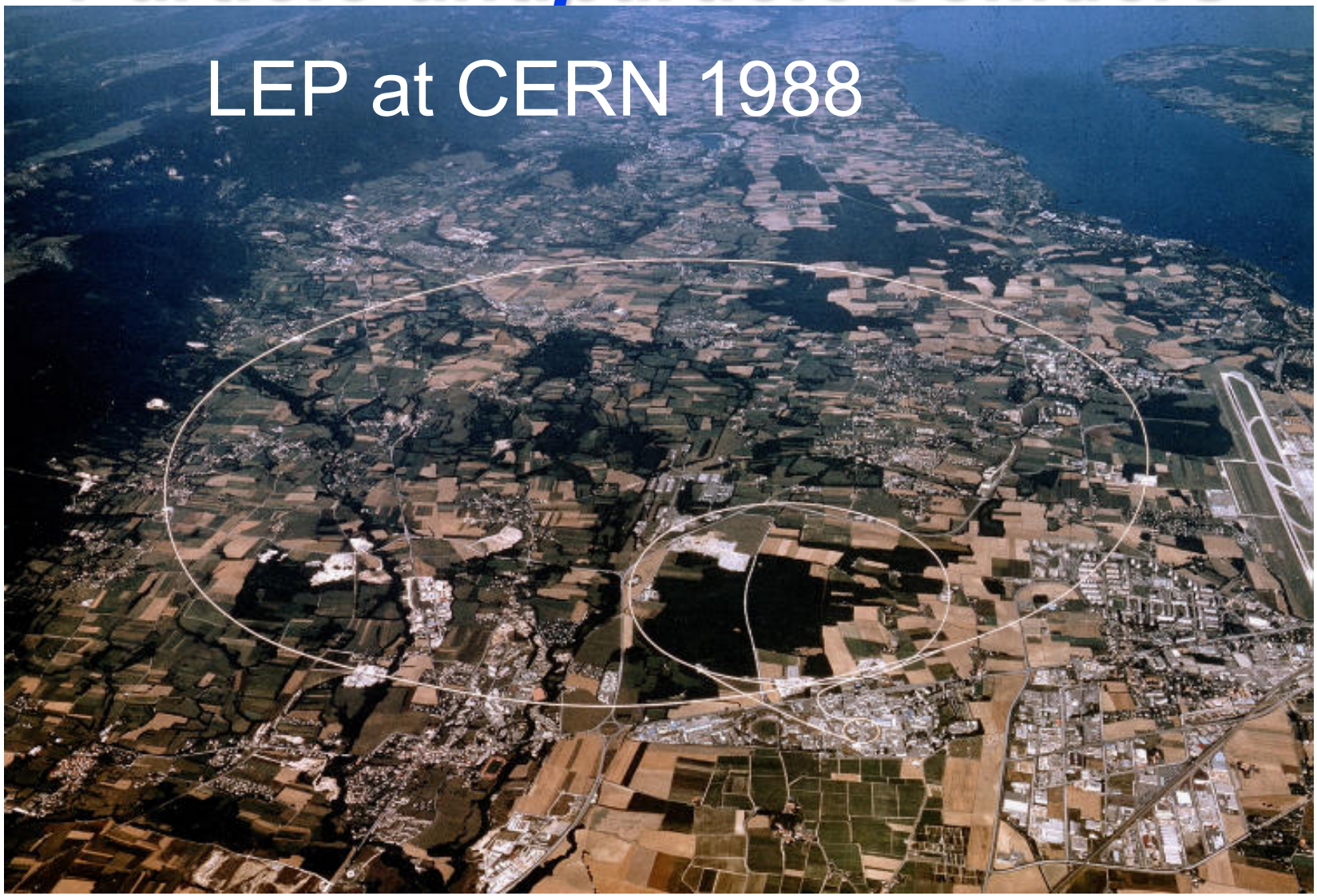



**E = m c$^2$**

**Maggiore e' l'energia,**

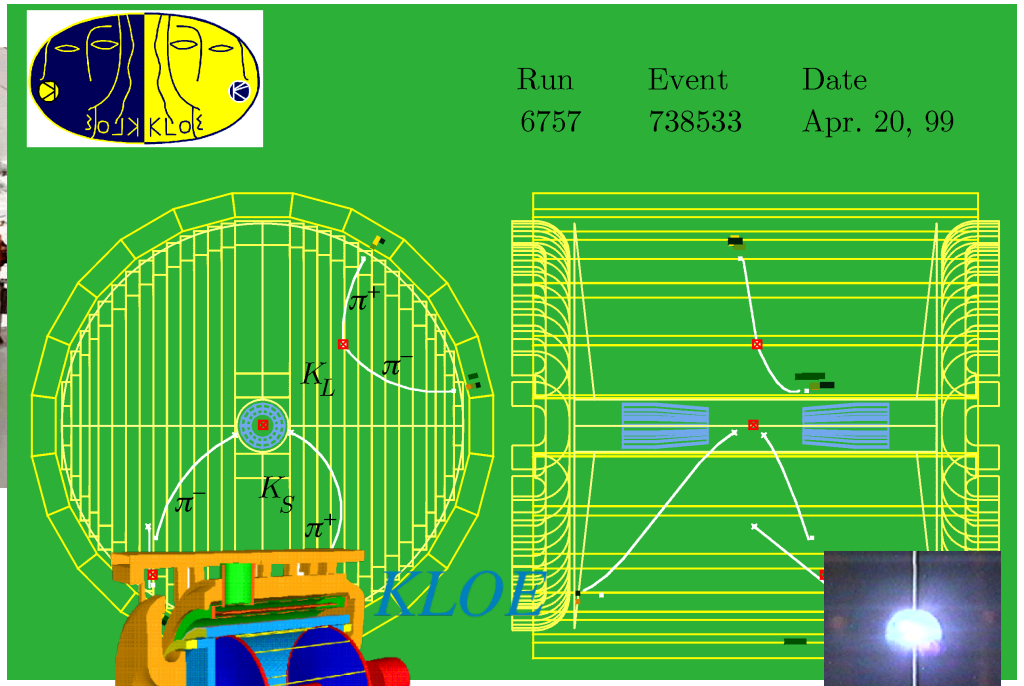
**piu' e piu' particelle si possono studiare…**

# *Particle-antiparticle colliders*

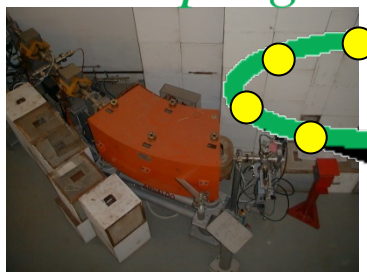



LHC at Cern (Geneve) 2008

# DAΦNE




Damping ring



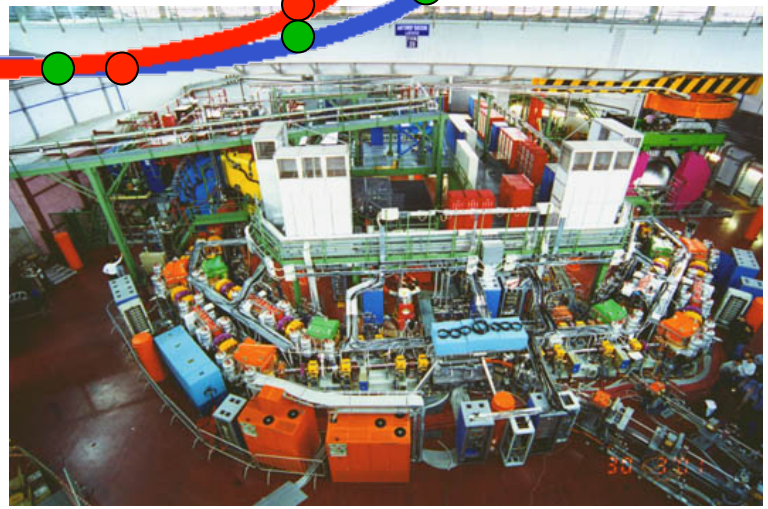
Test beam

Main rings

DAFNE-Light

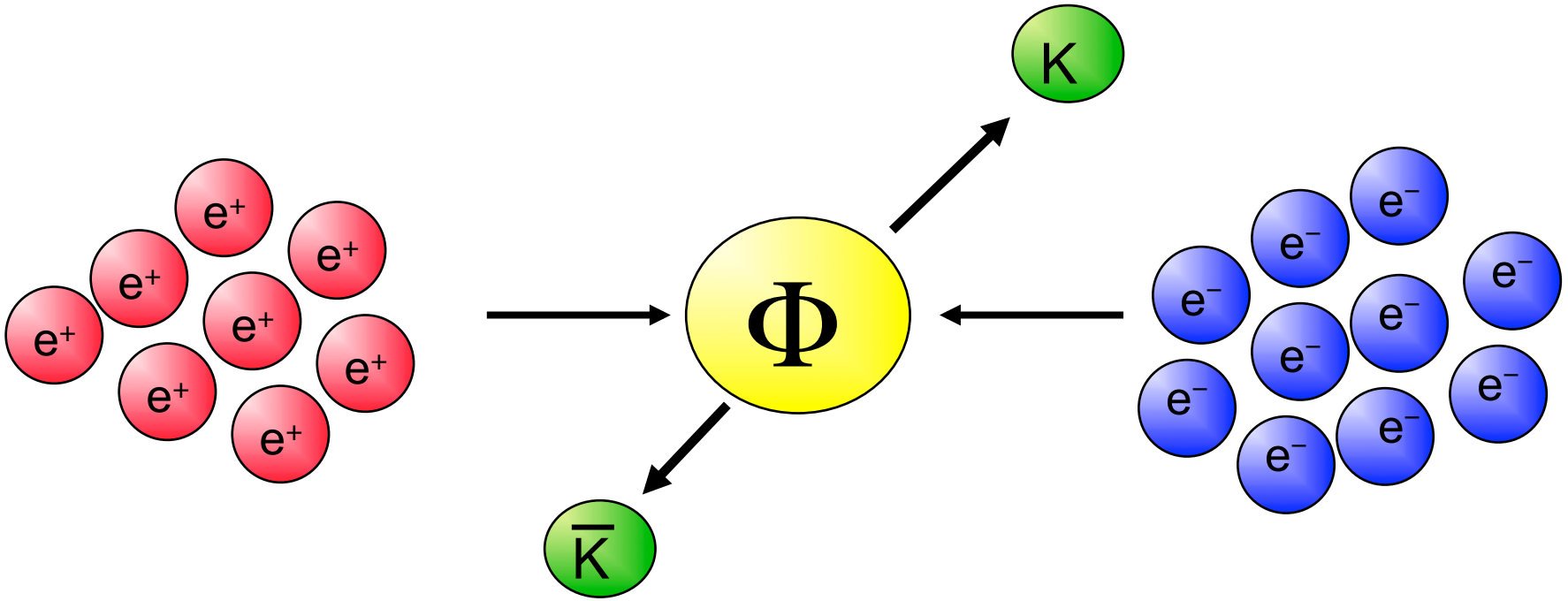
Linac

DEAR
FINUDA

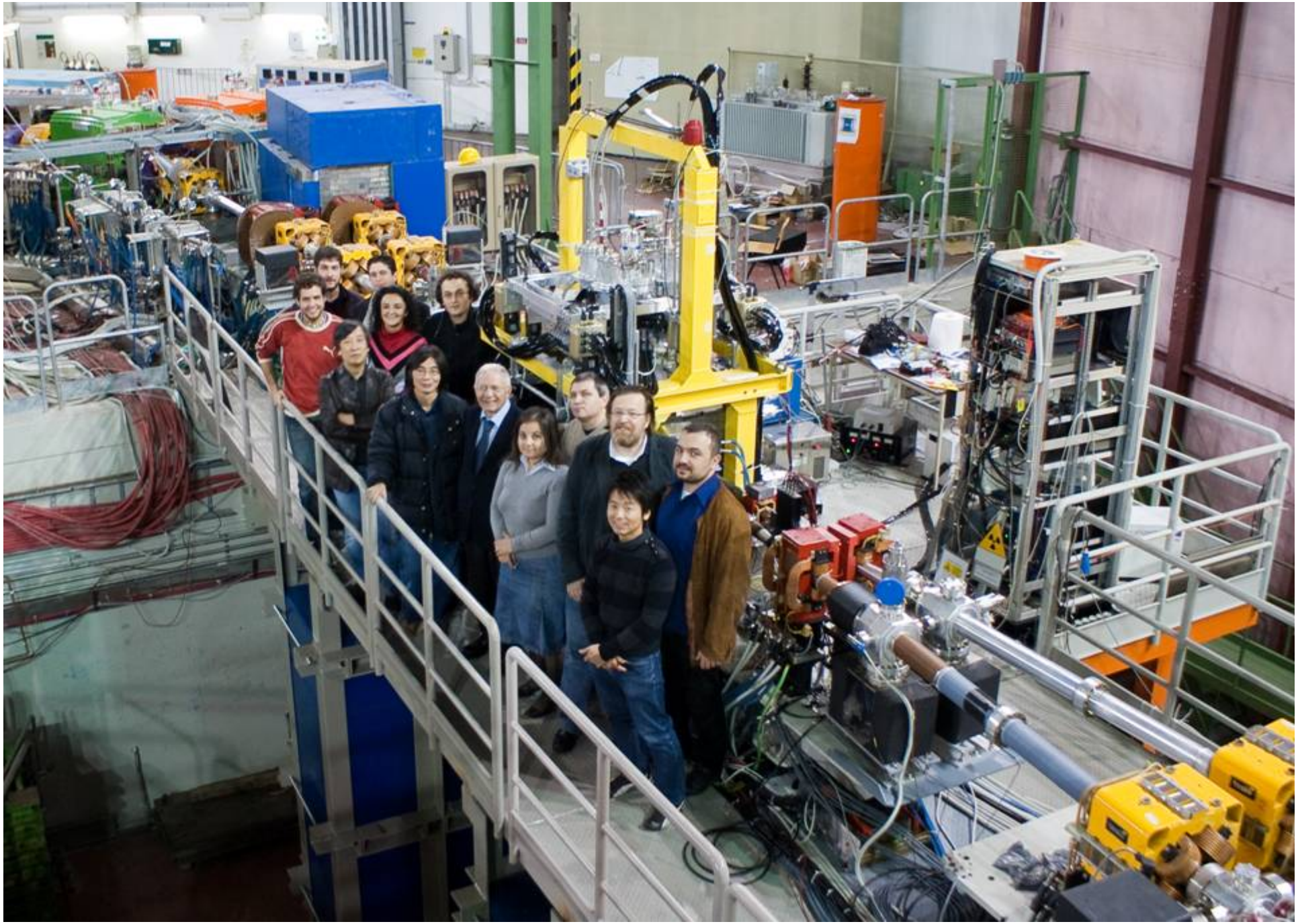


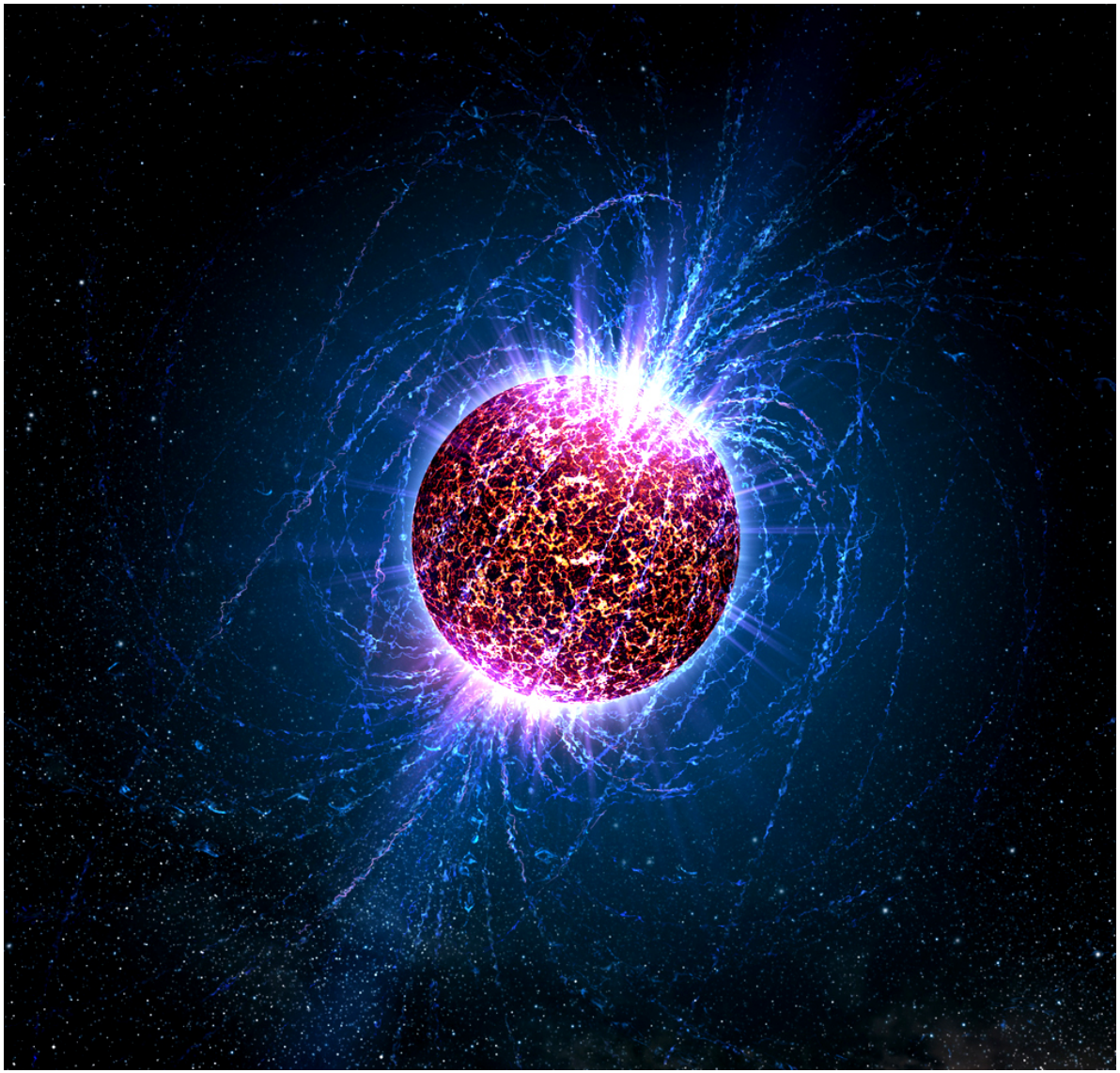
# *La fisica a DAΦNE*

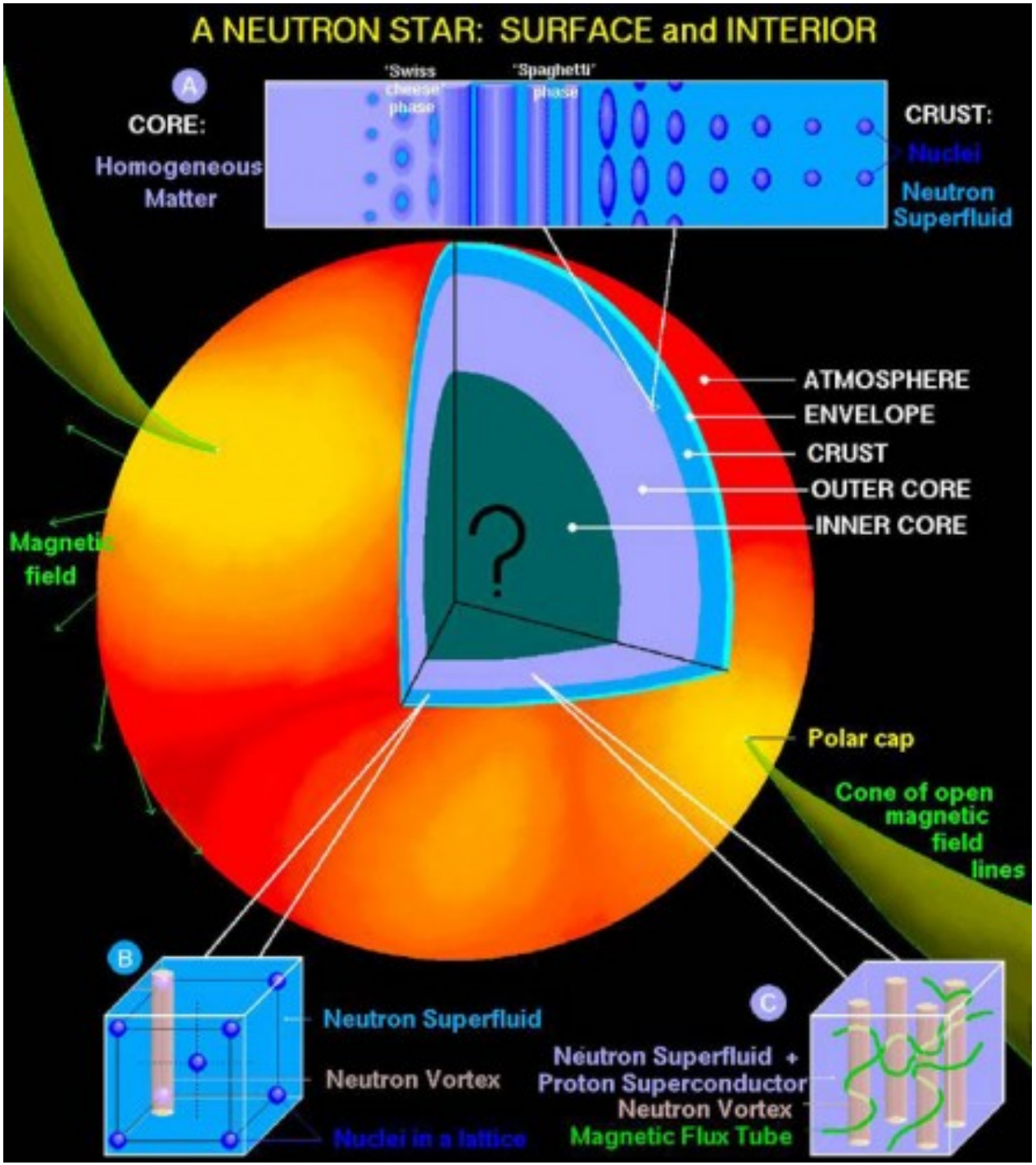
Dalle collisioni tra elettroni e positroni puo' essere prodotto il mesone Φ, che decade immediatamente in altre due particelle, i Kaoni *K*. I due *K* possono essere entrambi carichi o neutri.

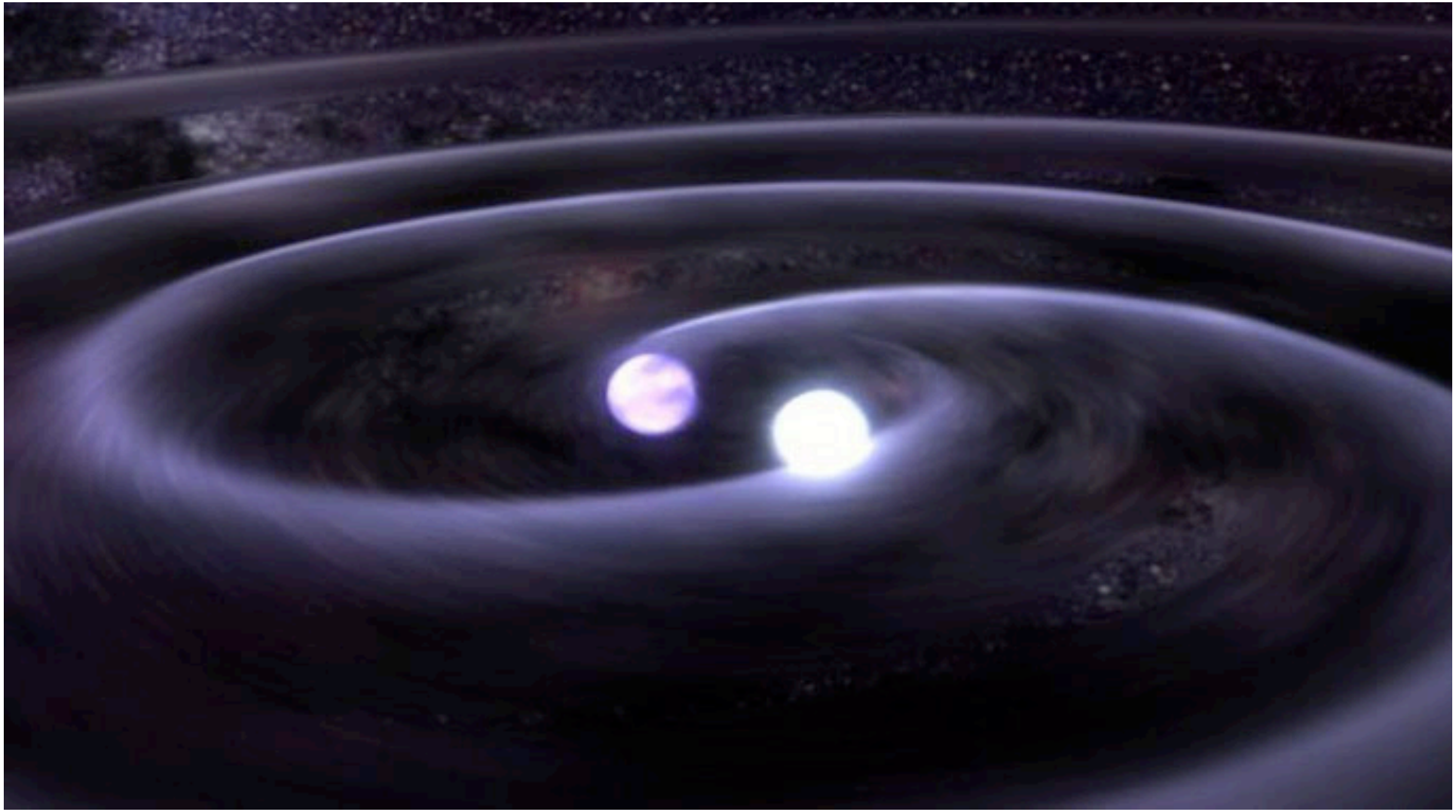



I *K* sono le particelle usate dai tre esperimenti DEAR, FINUDA e KLOE per i rispettivi obiettivi. La luminosità di DAΦNE, permette di produrre circa 10000 *K* al secondo.

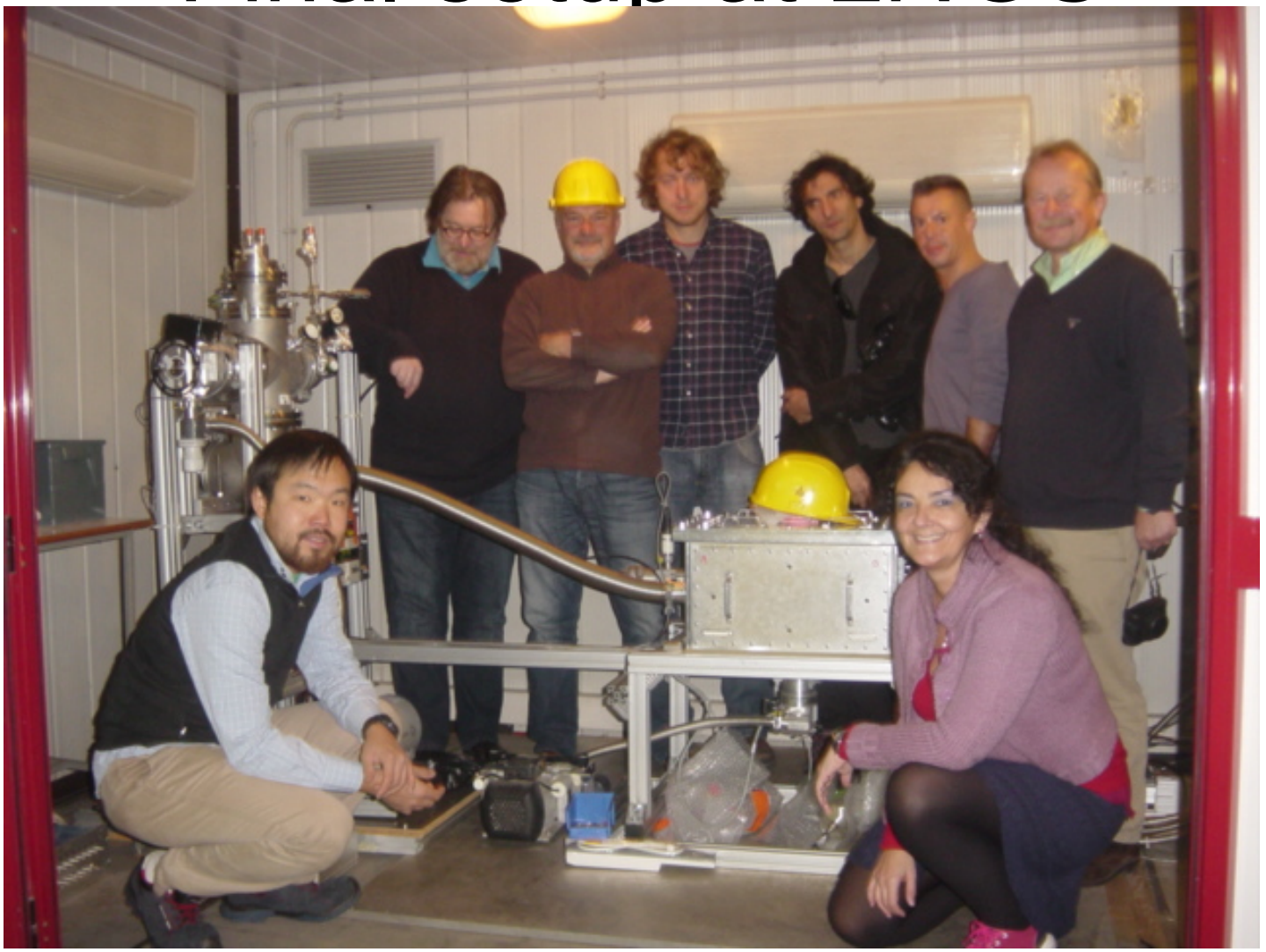




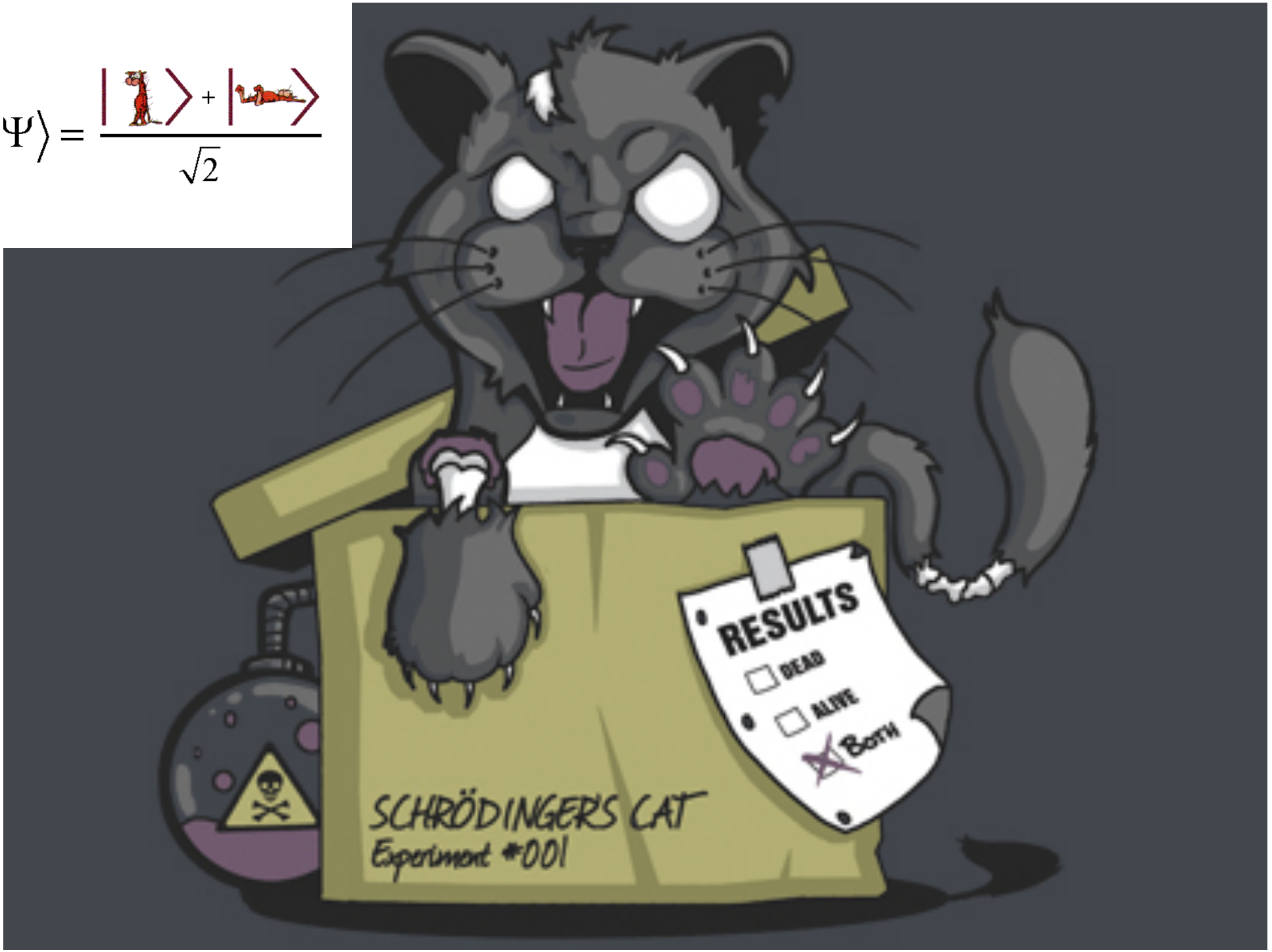

A NEUTRON STAR: SURFACE and INTERIOR
A
CORE:
Homogeneous Matter
'Swiss cheese' phase
'Spaghetti' phase
CRUST:
Nuclei
Neutron Superfluid
ATMOSPHERE
ENVELOPE
CRUST
OUTER CORE
INNER CORE
?
Magnetic field
Polar cap
Cone of open magnetic field lines
B
Neutron Superfluid
Neutron Vortex
Nuclei in a lattice
C
Neutron Superfluid +
Proton Superconductor
Neutron Vortex
Magnetic Flux Tube



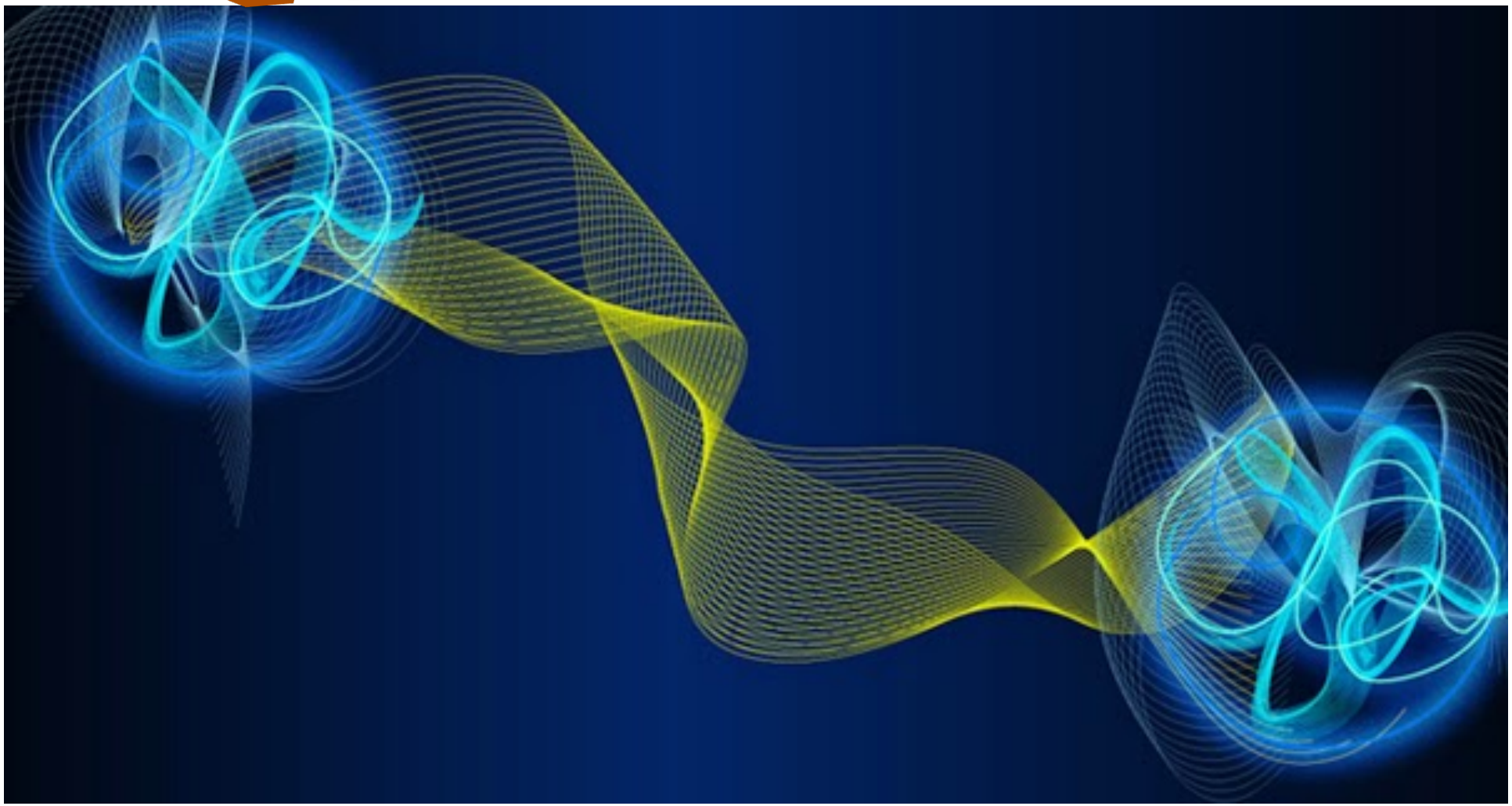
# Final setup at LNGS



$$\Psi\rangle = \frac{|\ \rangle + |\ \rangle}{\sqrt{2}}$$

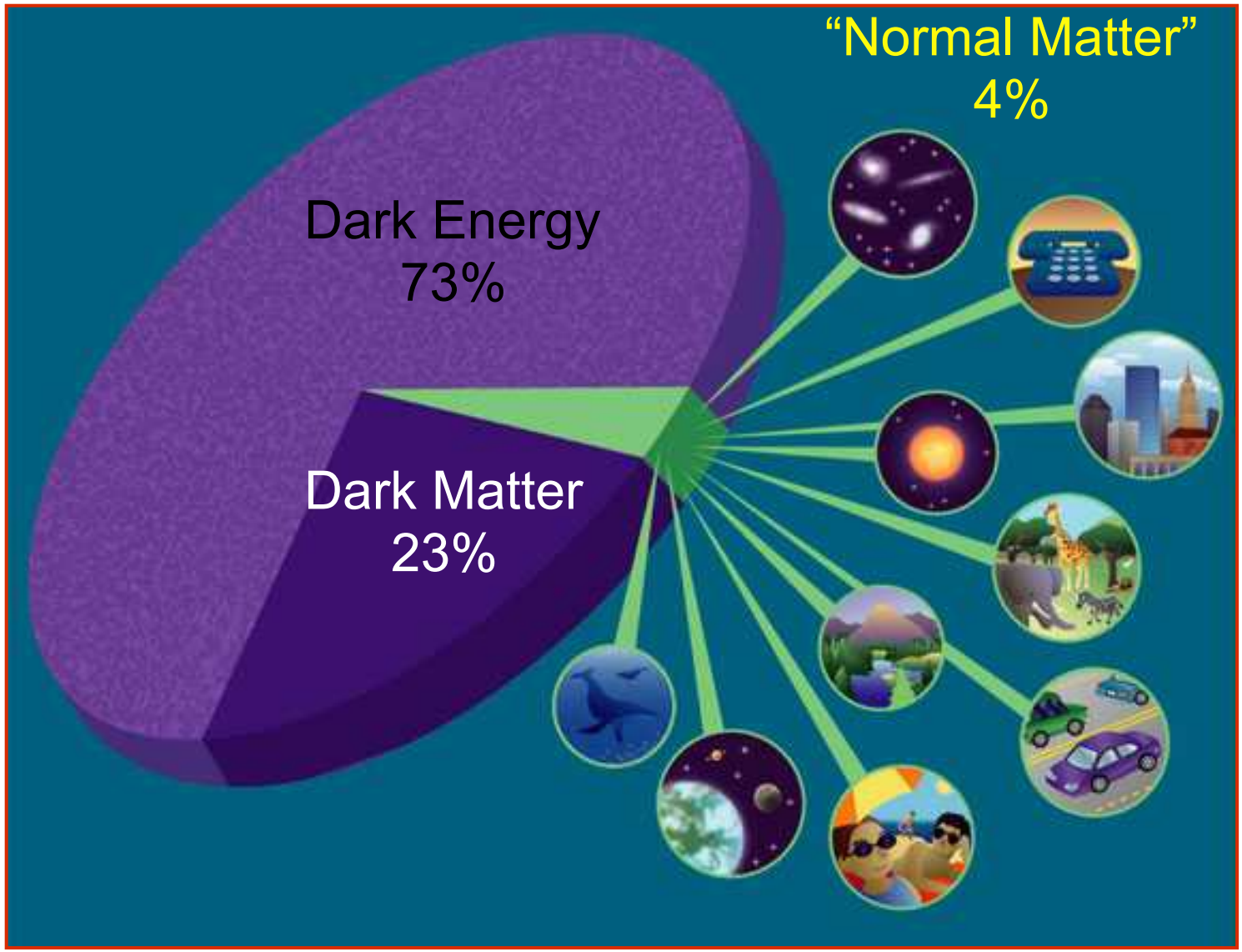


# L'entanglement

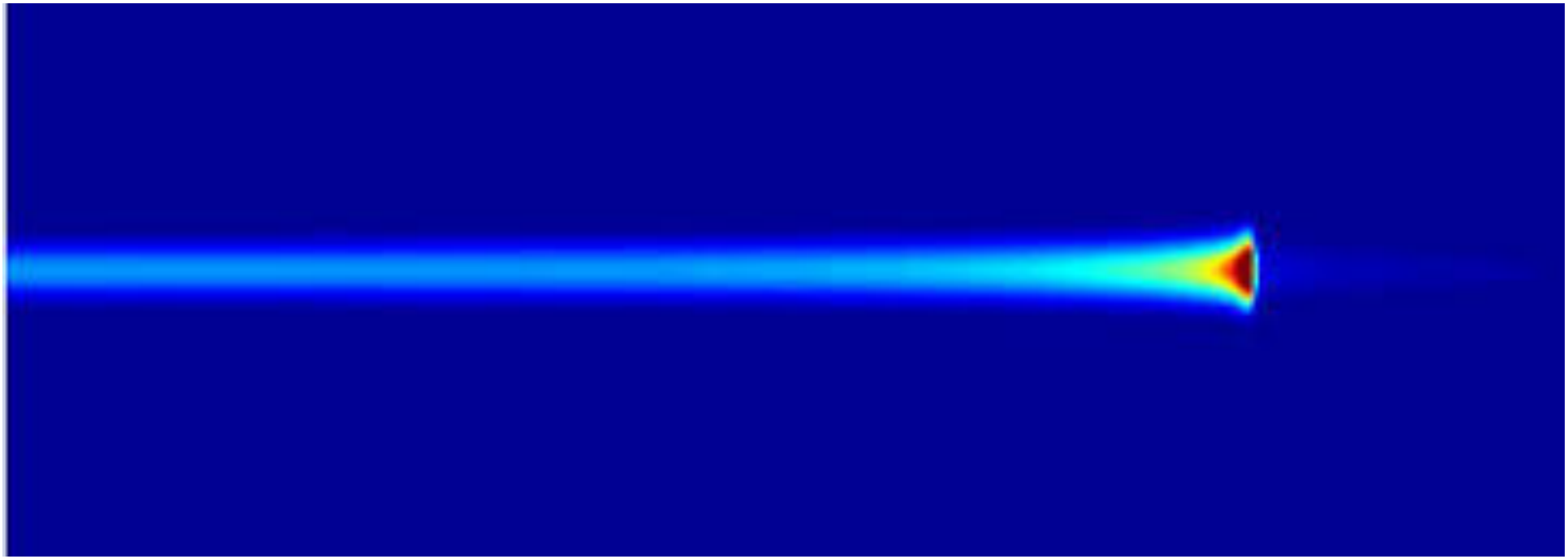


# Cosa accade all’interno di un buco nero?

# Materia ed energia



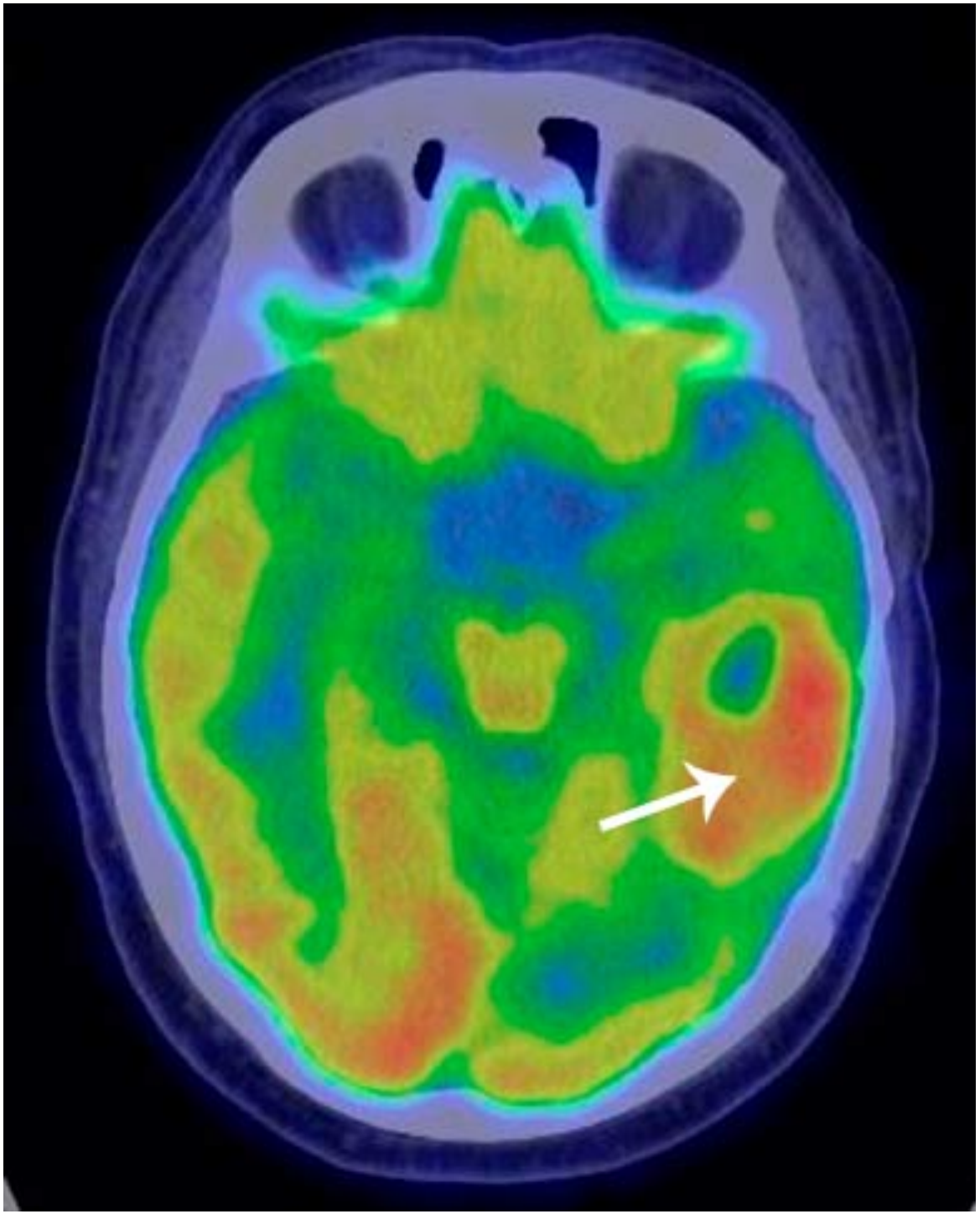
# Fisica Fondamentale e Societa'



# Conosciamo il CNAO

# Scopriamo l'alta tecnologia del CNAO facendo un tour e seguendo il fascio dall'origine fino al paziente …


ULTRA

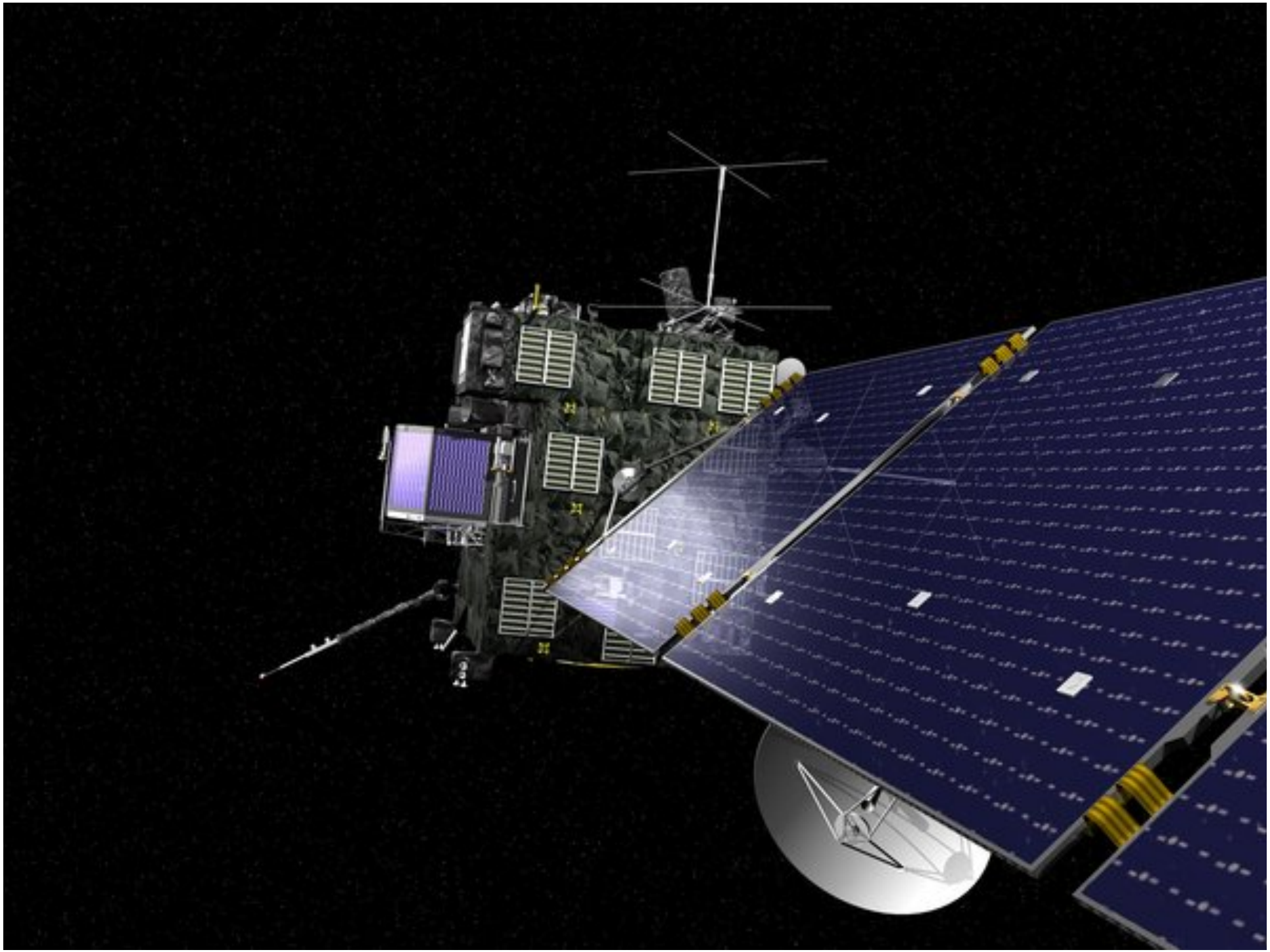


# Pentimenti

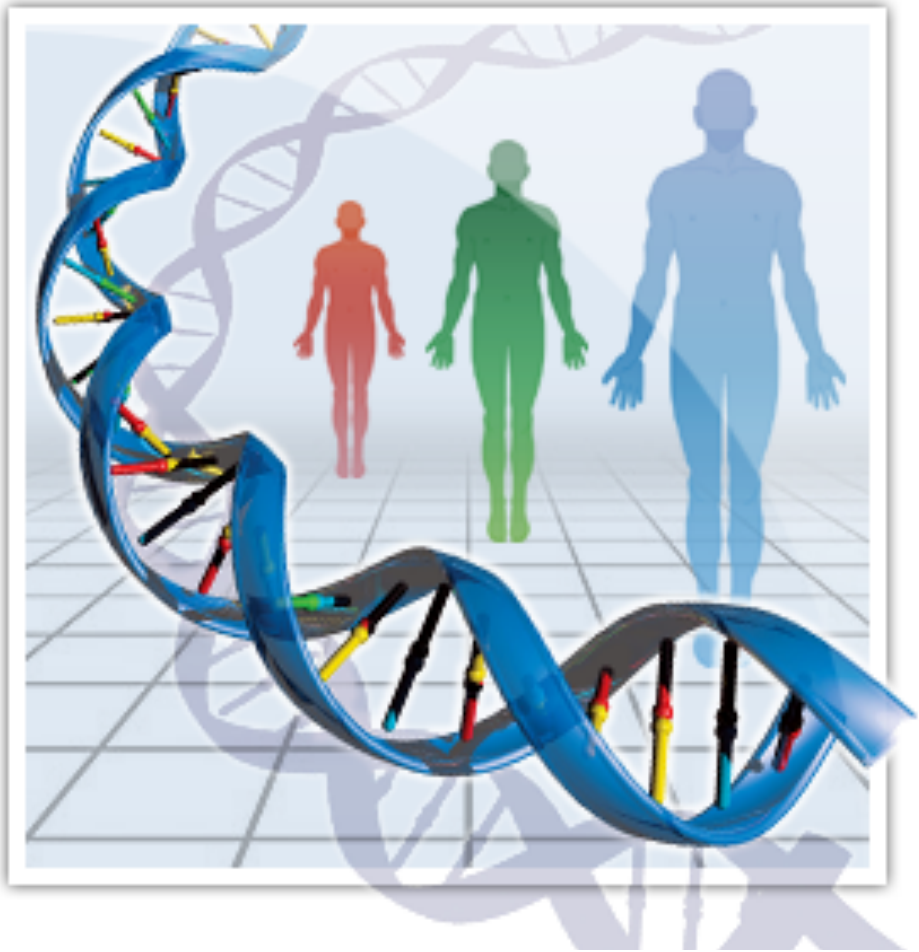
## Le Sueur – musa Urania (particolare)

# Riutilizzo tela

## Rembrandt – Ritratto di giovane uomo Titus




Ci sono due modi di vivere la vita. Uno è pensare che niente è un miracolo. L'altro è pensare che ogni cosa è un miracolo



# *Laboratori Nazionali di Frascati, info: http://www.lnf.infn.it/sis/*