



- 10h : **Du cosmos aux particules : les premiers instants de l'univers** avec *Boris Hippolyte*, (IPHC) – CNRS / Université de Strasbourg
- 10h30 : **Au cœur des noyaux atomiques (ISOLDE au CERN)** avec *David Lunney*, (IJCLab) – CNRS / Université Paris-Saclay
- 11h30 : **Fabriquer de l'antimatière** avec *Pauline Comini*, (DPHP) – CEA / IRFU / Université Paris-Saclay

→ **Vraies histoires du CERN :
un spectromètre perdu...
et un spectromètre trouvé !**

cité
sciences
et industrie **conférences**

**Raconte-moi
le CERN**
70 ans d'exploration de l'infiniment petit

28—29 septembre 2024
de 10h30 à 19h

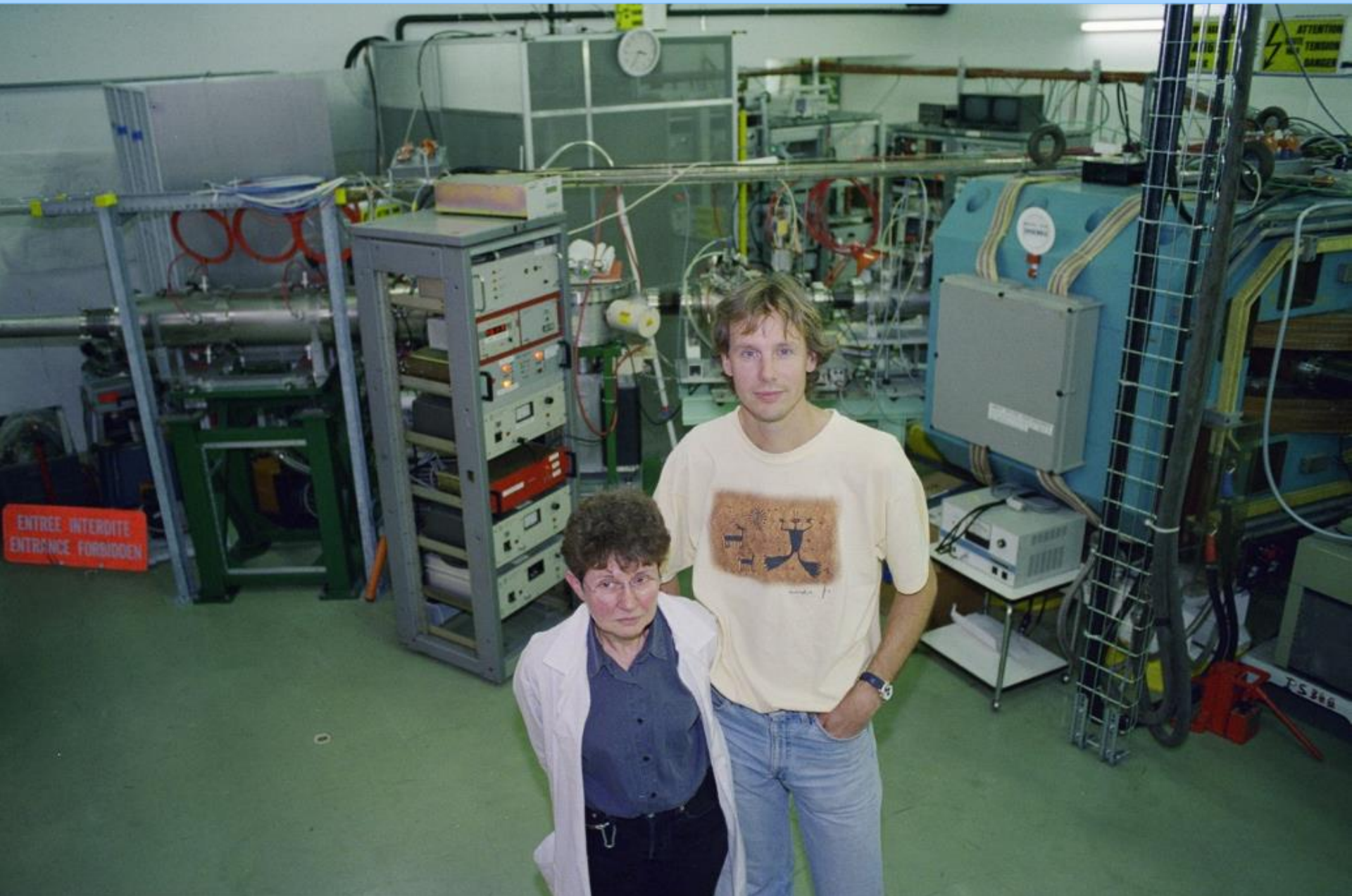
En partenariat avec

REPUBLIQUE FRANÇAISE
M - Porte de la Villette
cite-sciences.fr
#Conférences

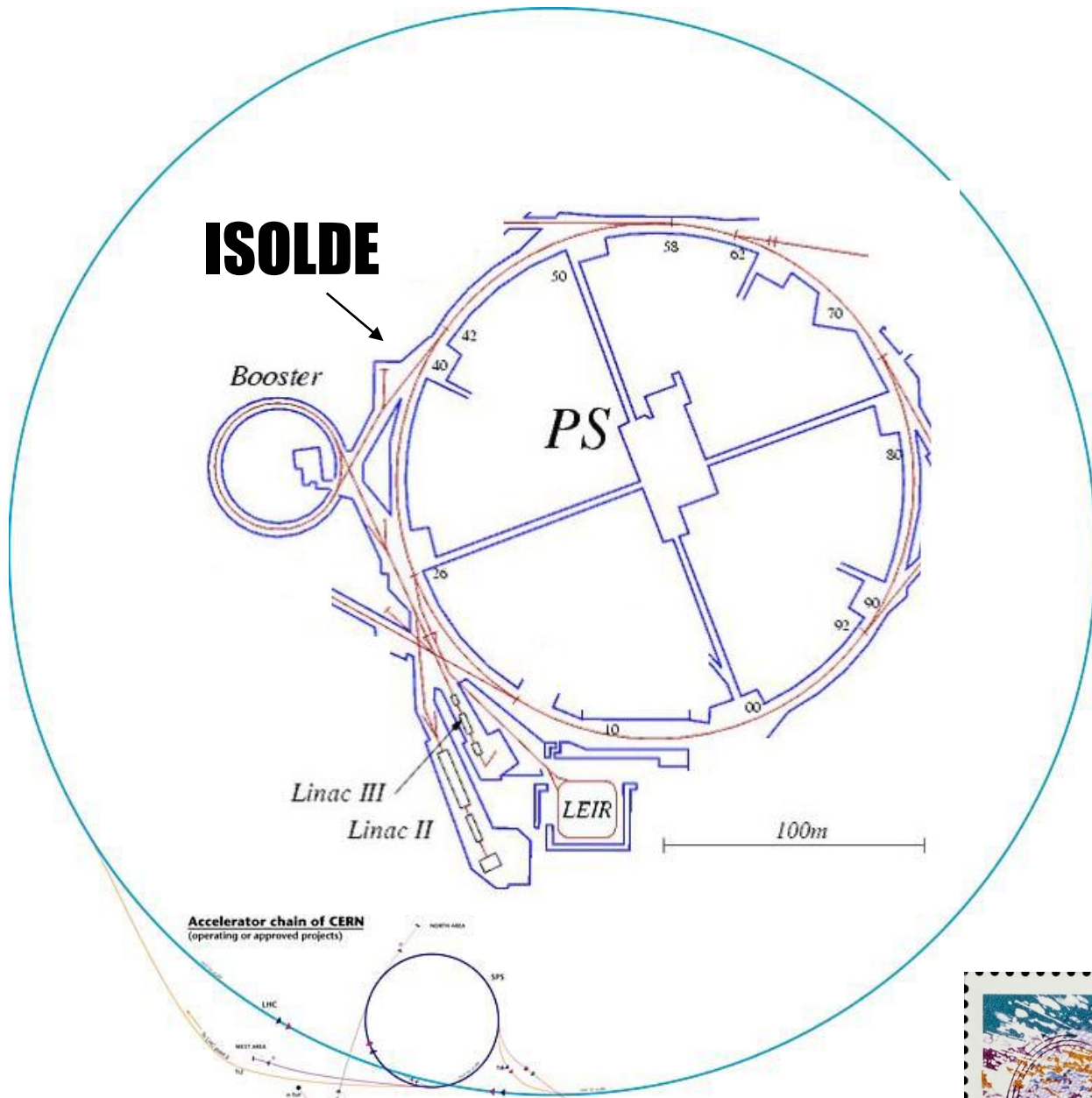
CEA CNRS SF



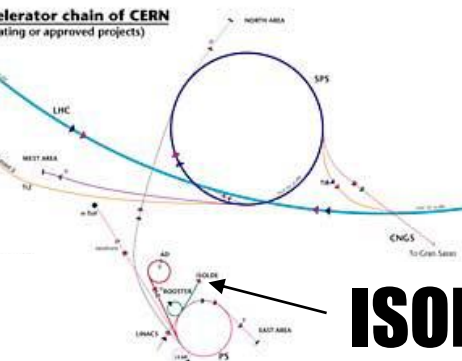
Il était une fois au CERN (1997) :

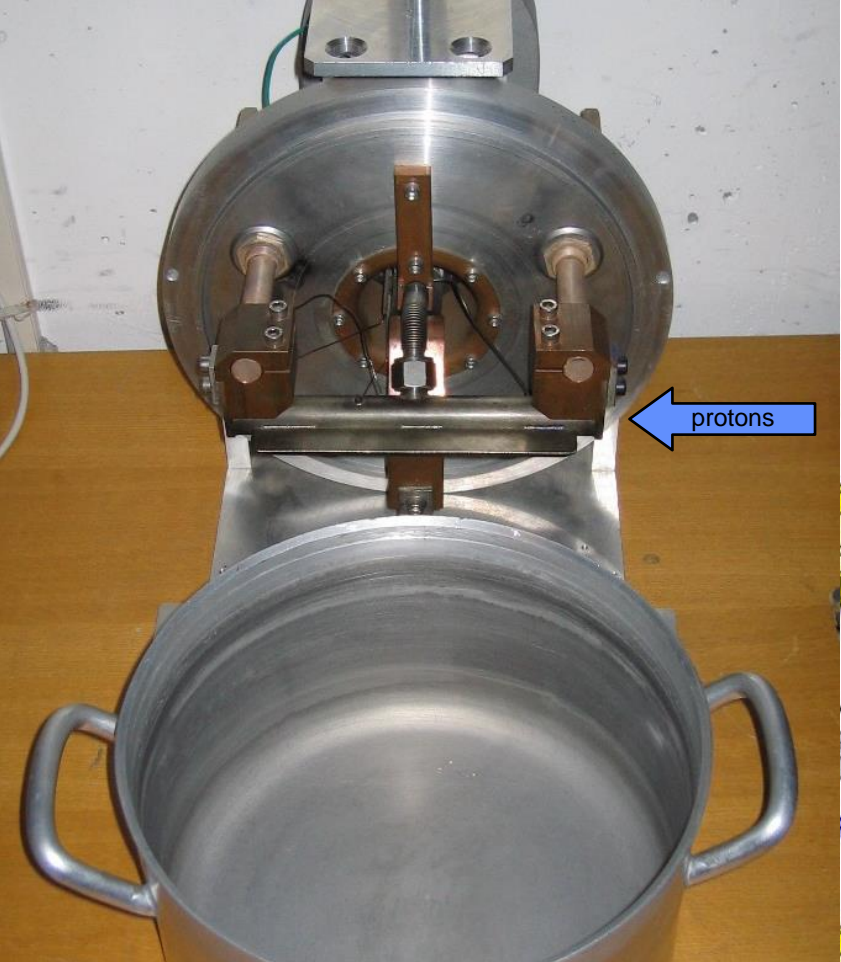


à côté du spectromètre de masse MISTRAL à l'installation ISOLDE

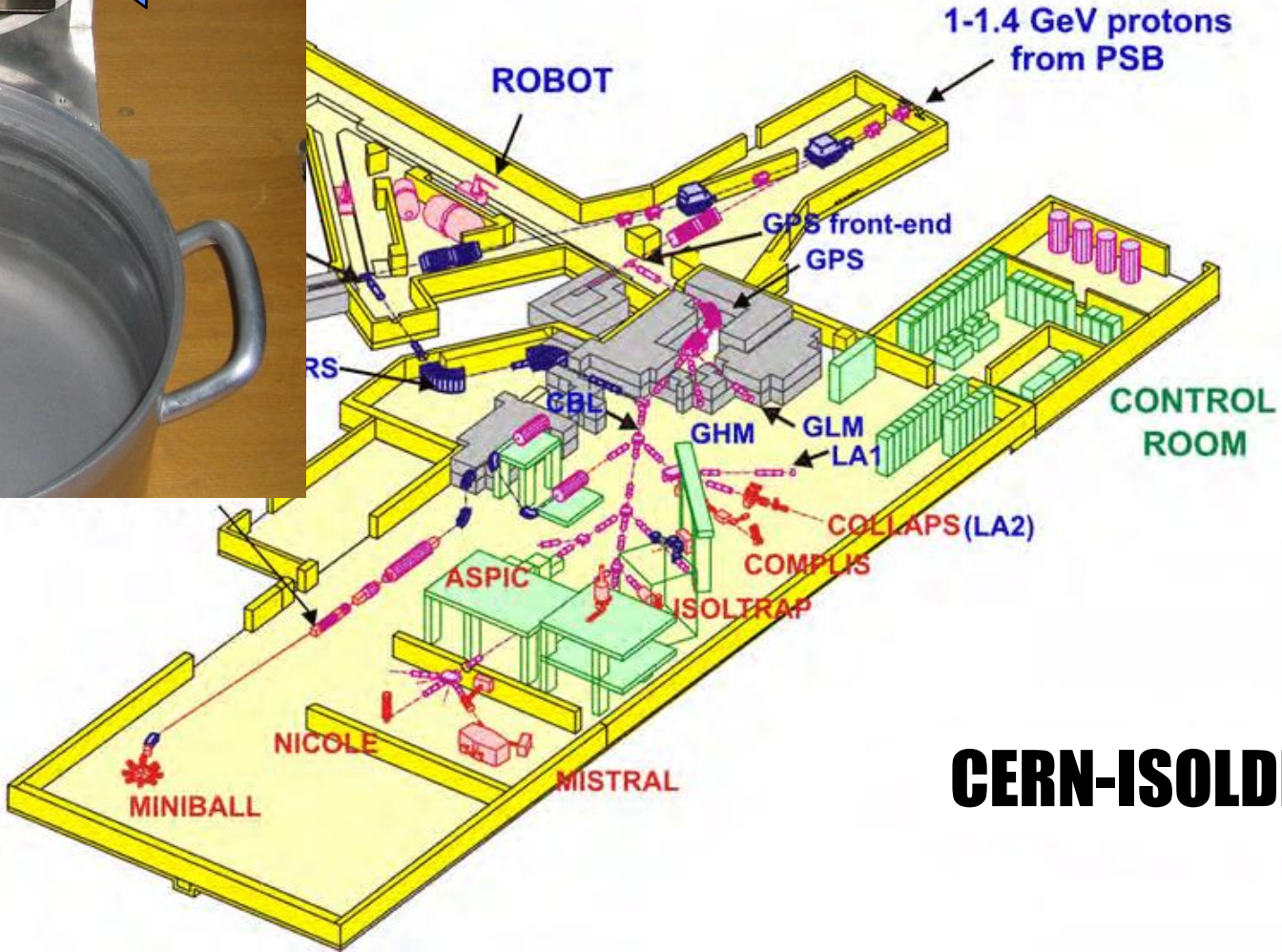


Accelerator chain of CERN
(operating or approved projects)

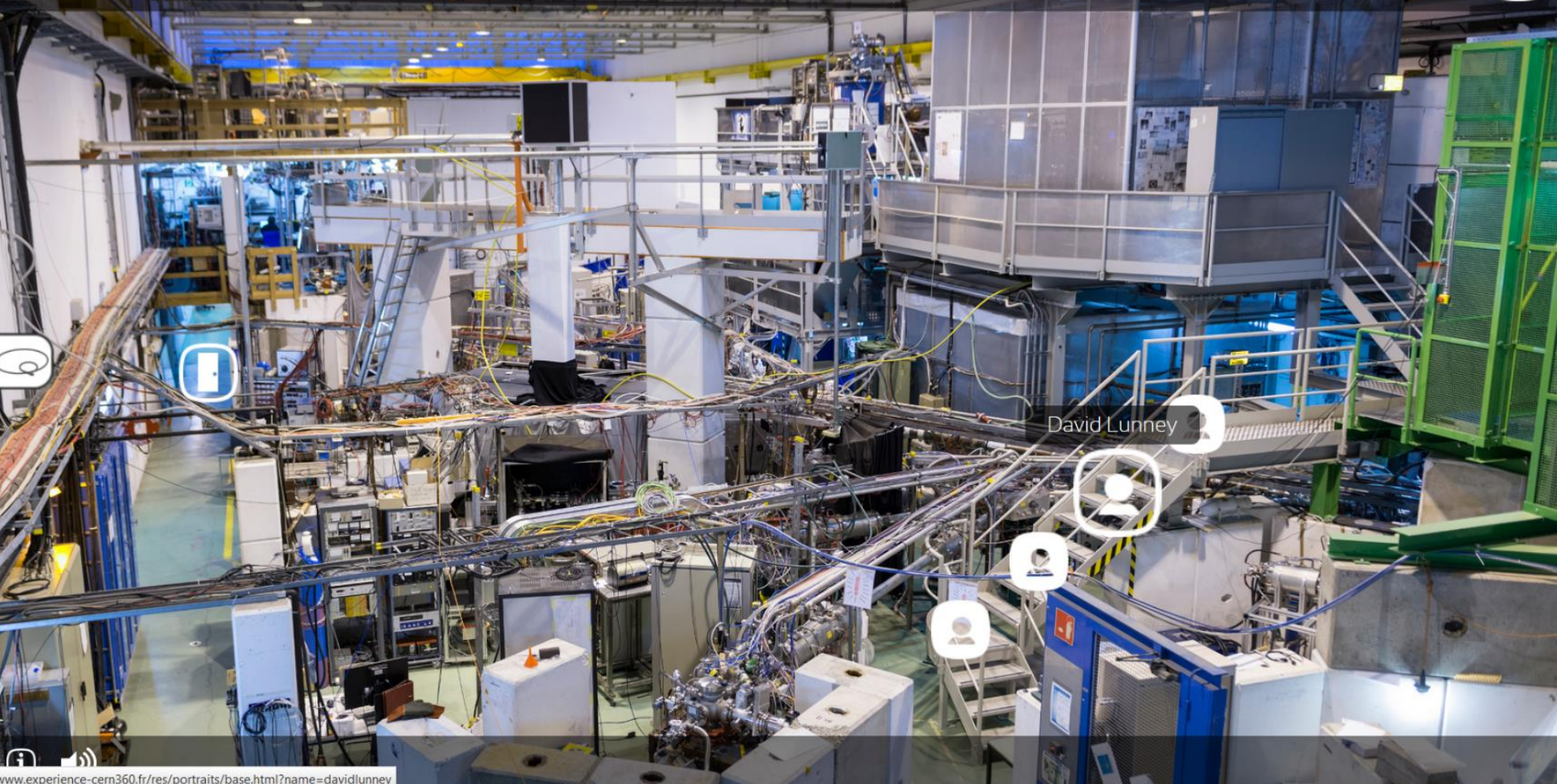




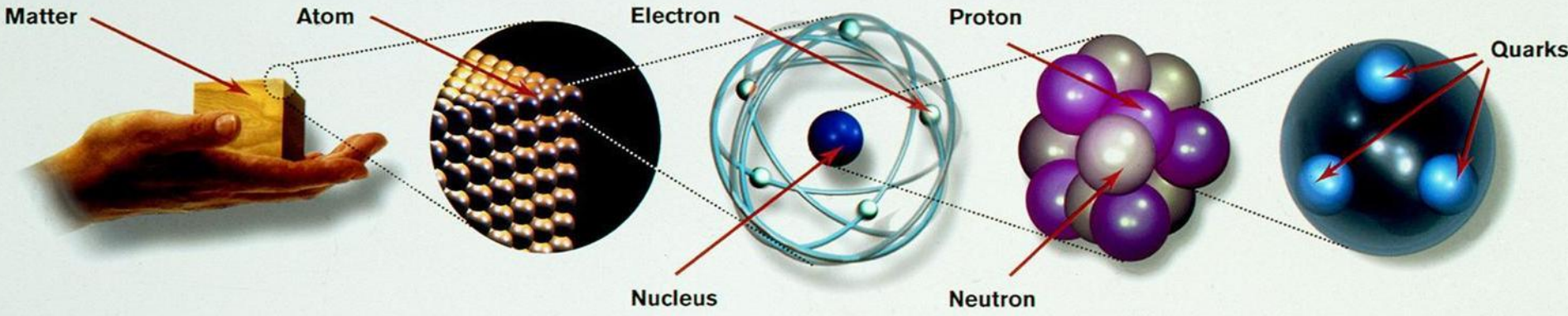
RADIOACTIVE LABORATORY



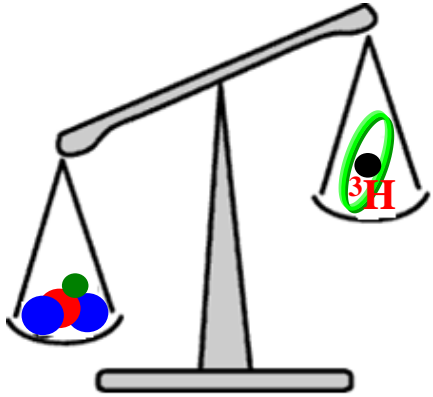
CERN-ISOLDE



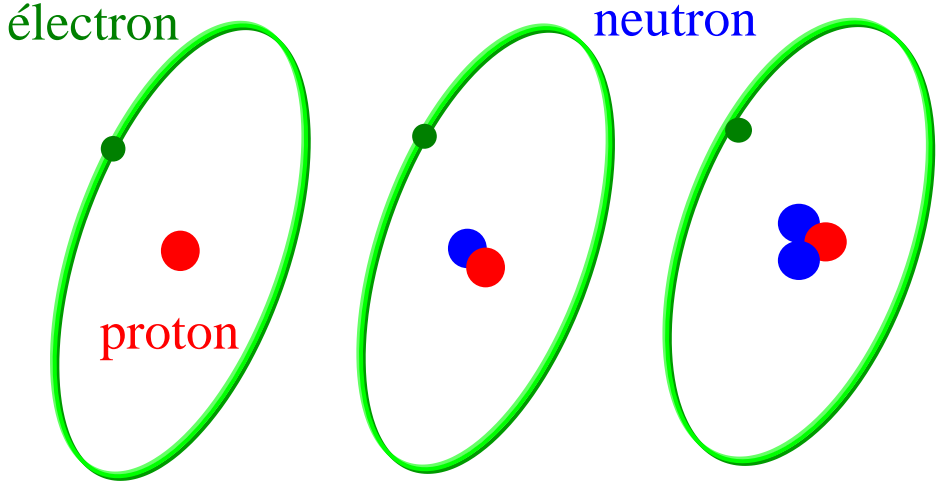
La matière dans les étoiles : les atomes - infiniment petits !



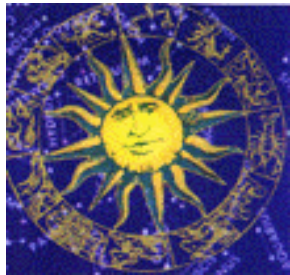
$$E = mc^2$$



masse → l'énergie de liaison



hydrogène : ^1H deutérium : ^2H tritium : ^3H
demi-vie : 12.3 ans

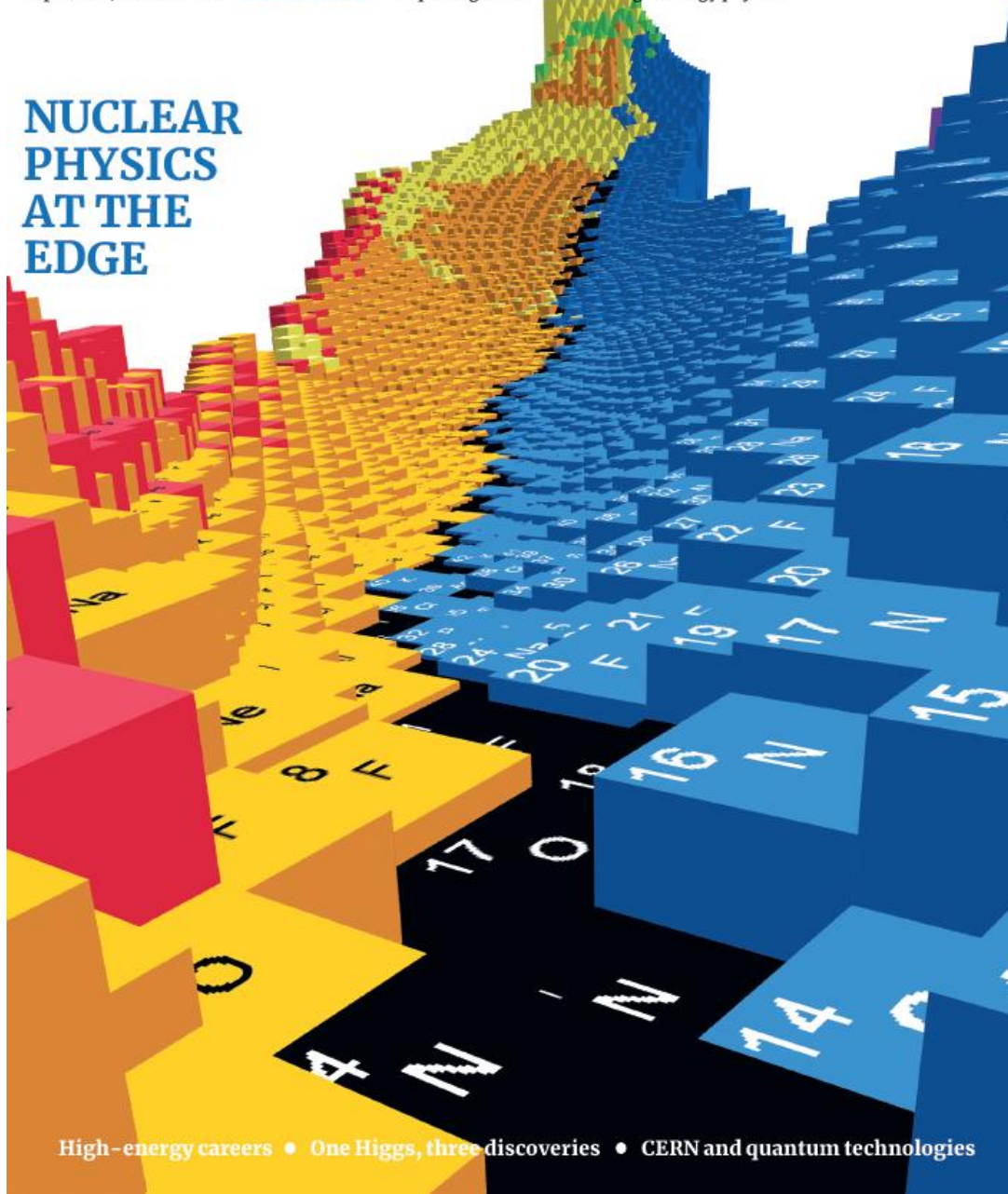


Les isotopes de l'hydrogène

CERN COURIER

September/October 2020 cerncourier.com Reporting on international high-energy physics

NUCLEAR PHYSICS AT THE EDGE



High-energy careers • One Higgs, three discoveries • CERN and quantum technologies



The
ORIGINS
of
GOLD



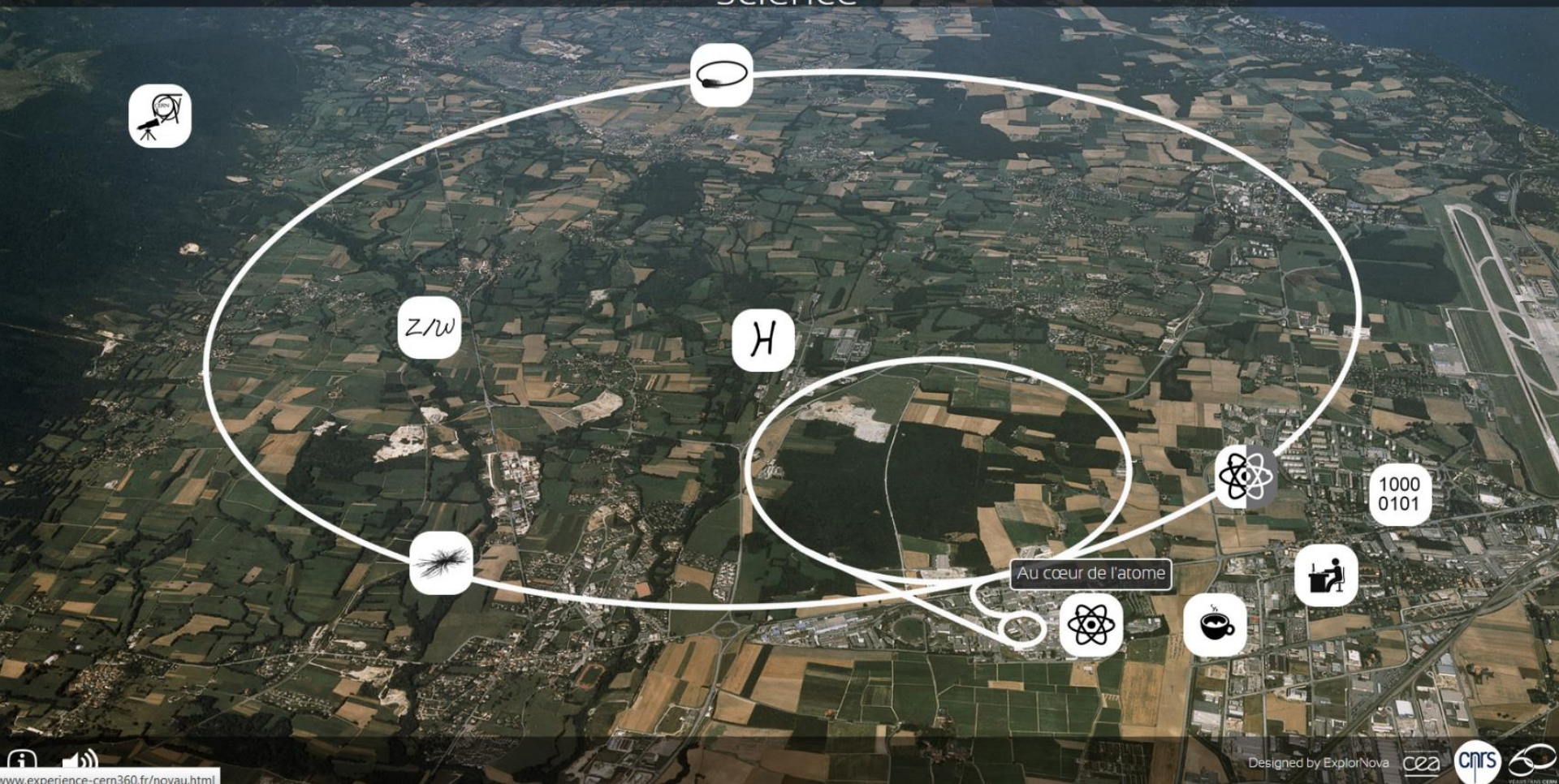
MISTRAL mis à la retraite (2010) :



Avis de recherche : aimant de 25 tonnes !



Immersion dans l'accélérateur de science

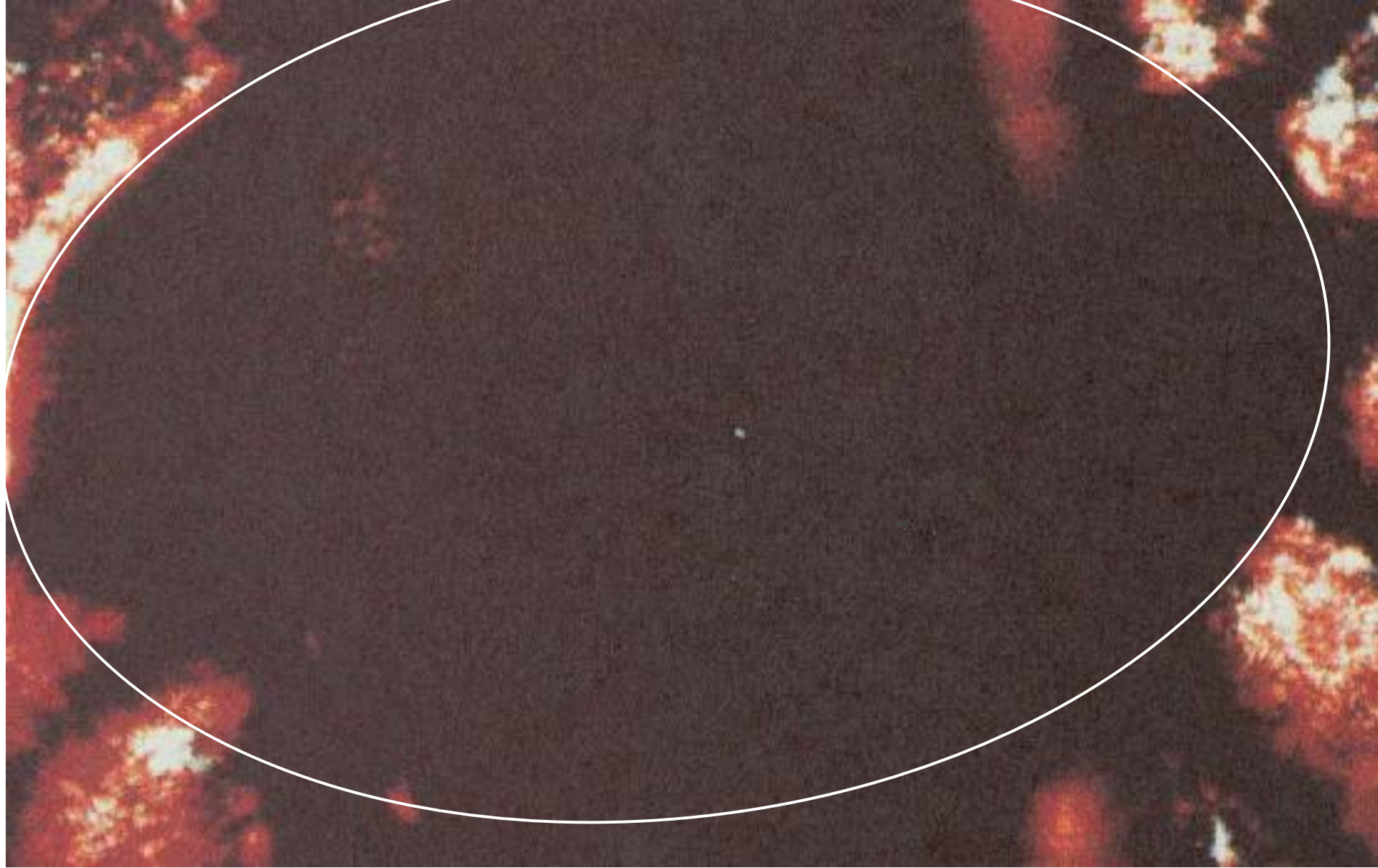


Z/W

H

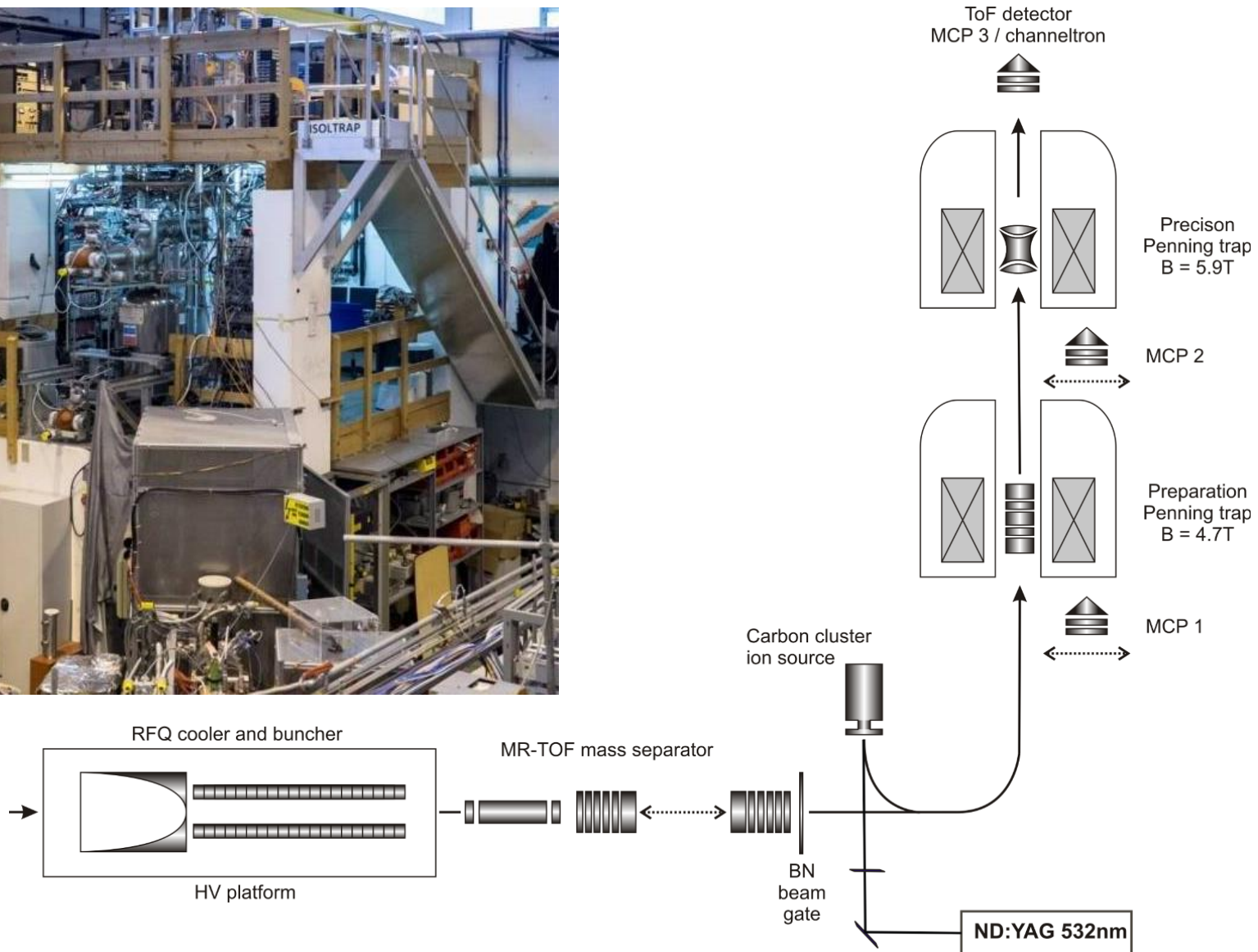
Au cœur de l'atome

1000
0101

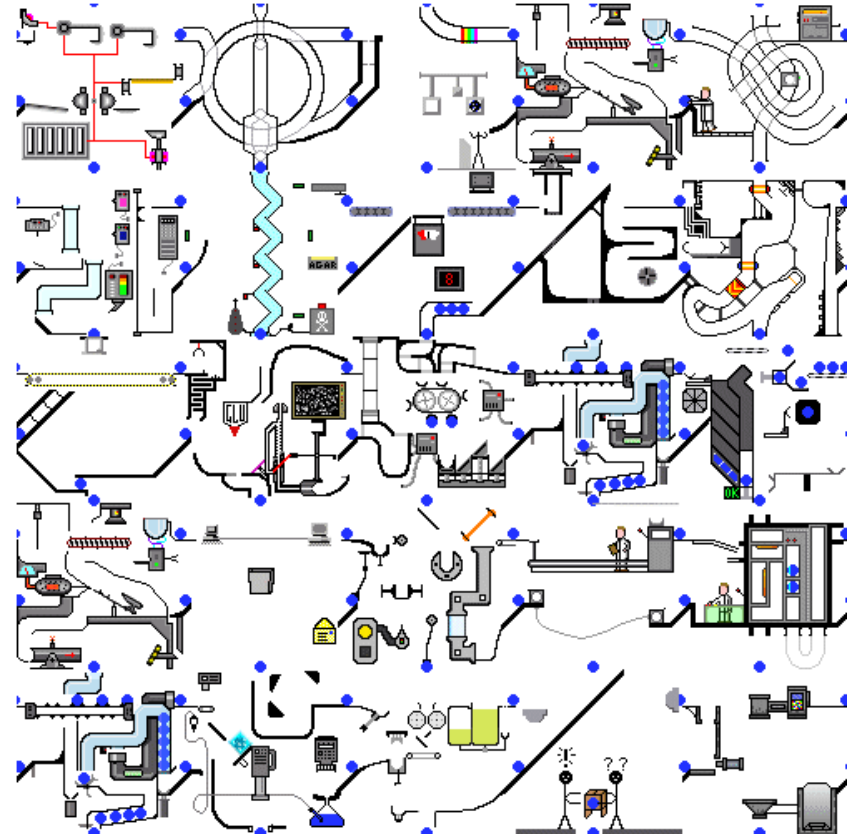


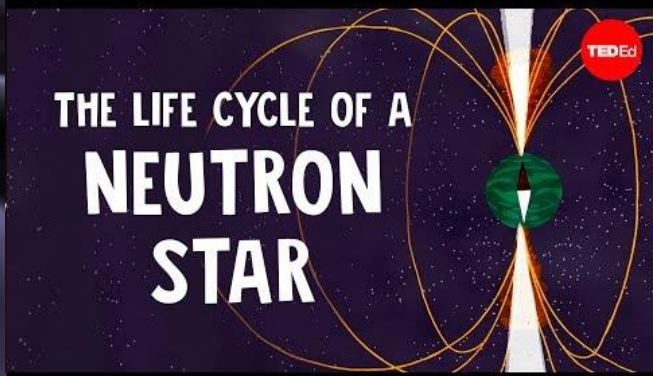
Astrid - H. Dehmelt (prix Nobel, 1989)

The ISOLTRAP spectrometer @ ISOLDE



The ISOLTRAP spectrometer @ ISOLDE





GW170817: dawn of multimessenger astronomy (image: ESA)

LIBÉRATION VENDREDI 21 JUIN 2013

SCIENCES **31**

PHYSIQUE Le poids des atomes de calcium éclaire les mystères de leur noyau.

Des nucléons teintés d'exotisme



L'expérience Isolde, au Cern, fabrique des atomes exotiques. PHOTO MAXIMILIEN BRICE, CERN

INTERNATIONAL JOURNAL OF HIGH-ENERGY PHYSICS
CERN COURIER
 VOLUME 53 NUMBER 3 APRIL 2013

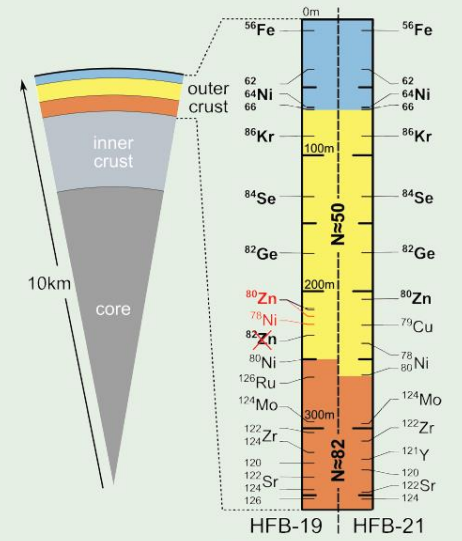
ISOLTRAP casts light on neutron stars



PHYSICAL REVIEW LETTERS™

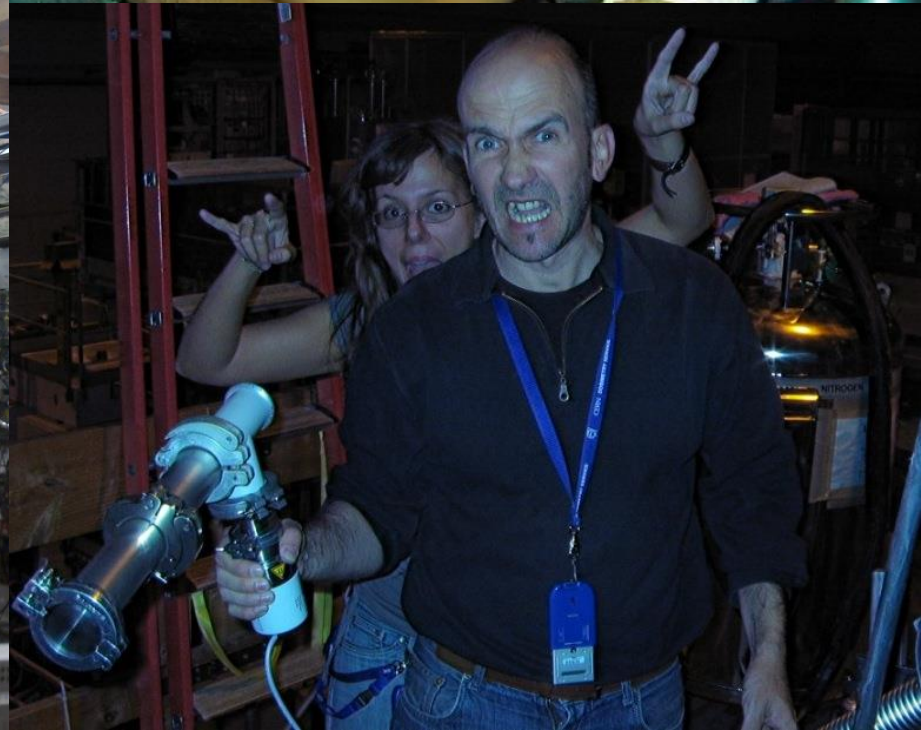
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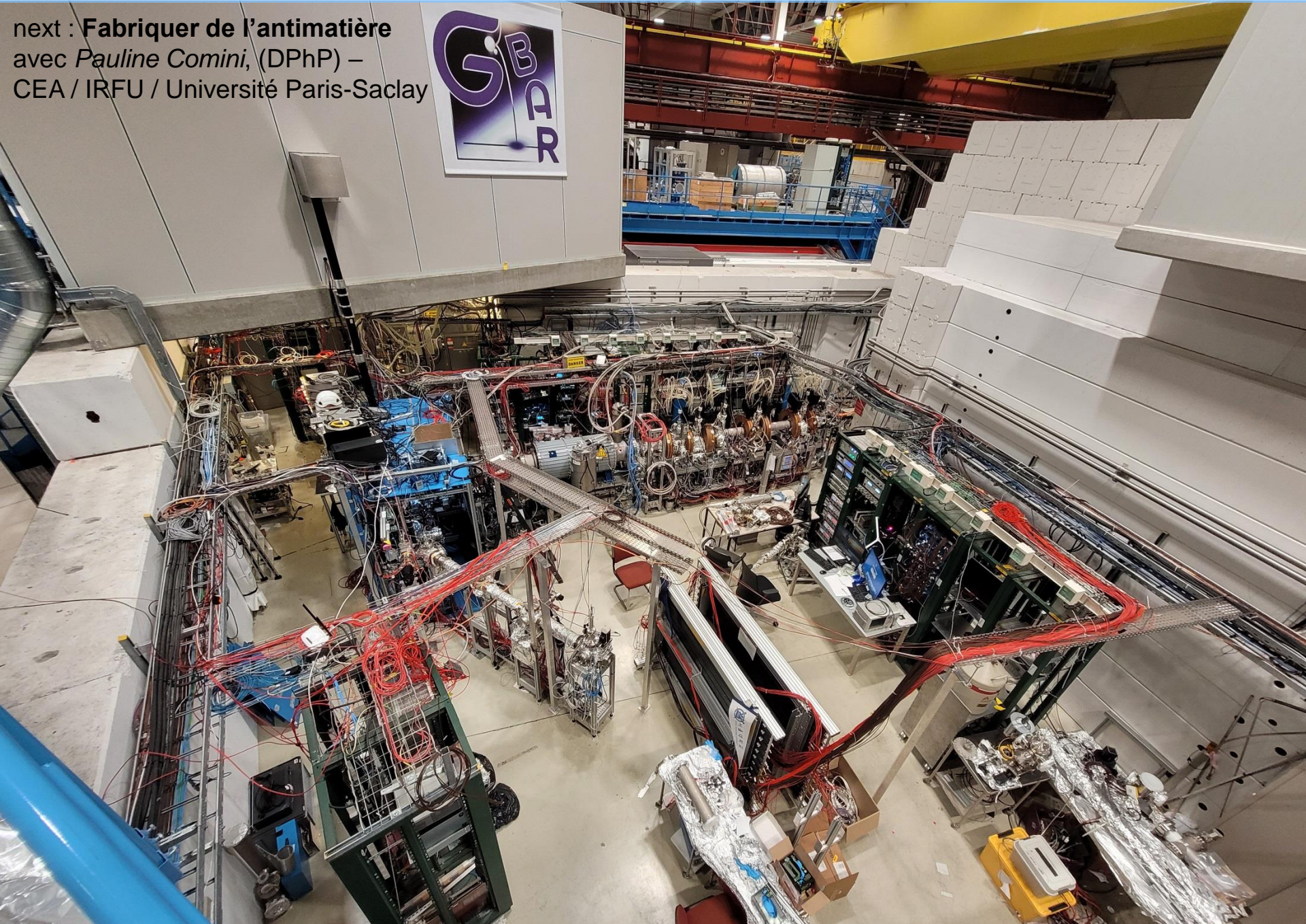


2018 - MISTRAL trouvé !



2024 - MISTRAL recyclé !

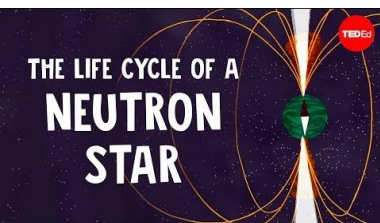
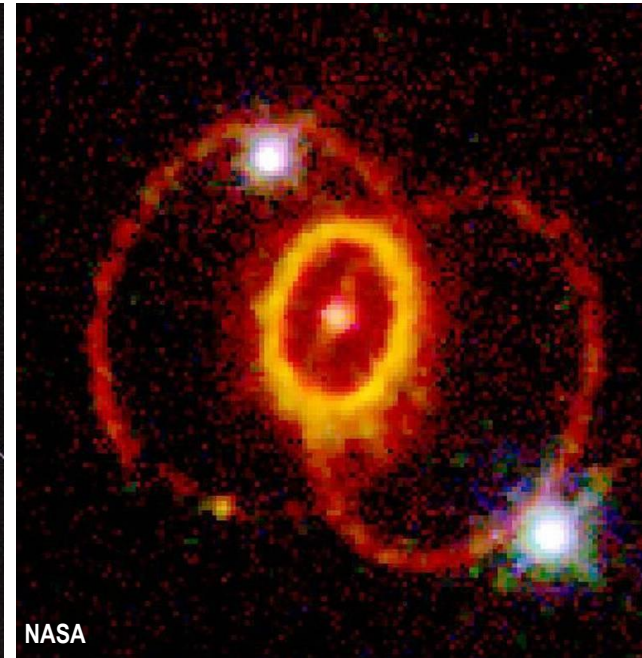
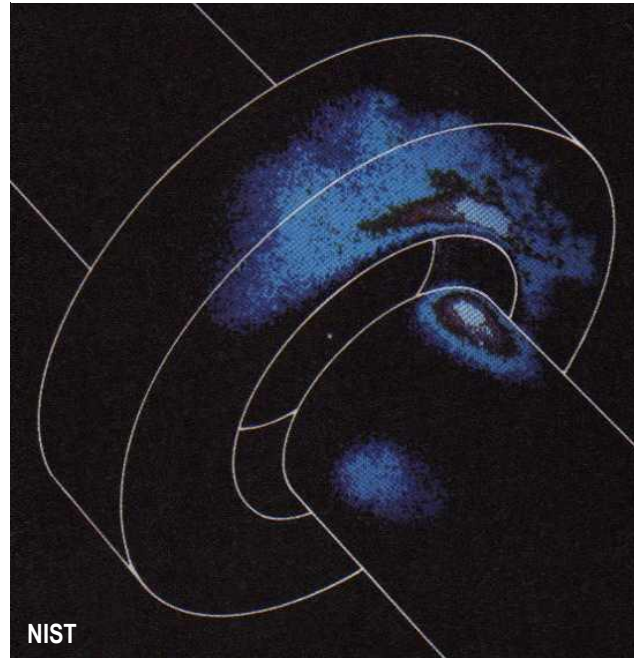
next : Fabriquer de l'antimatière
avec *Pauline Comini*, (DPhP) –
CEA / IRFU / Université Paris-Saclay





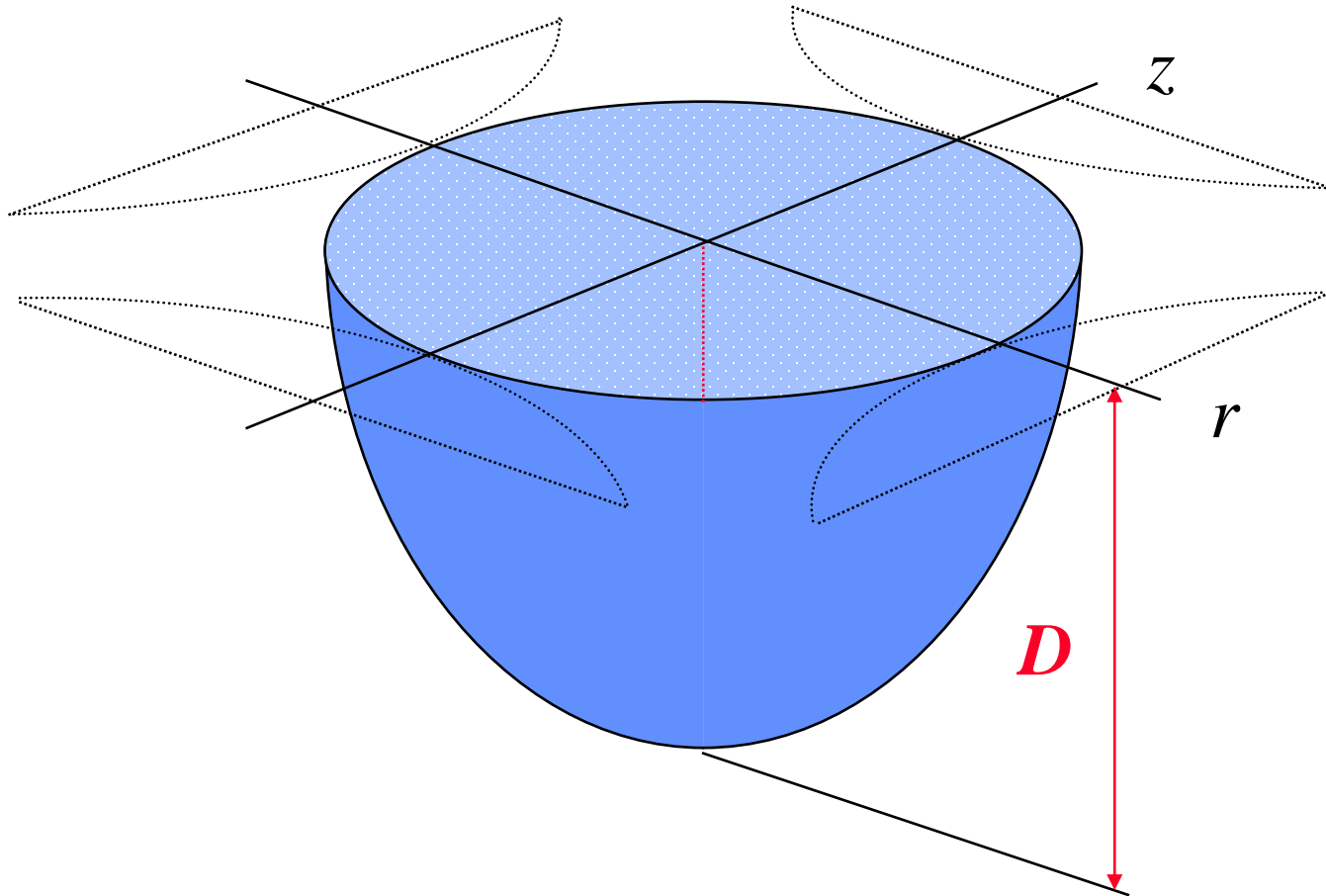
Le mystère du noyau : l'interaction nucléaire, l'origine des éléments, ... et ?

De l'infiniment petit... à l'infiniment grand!



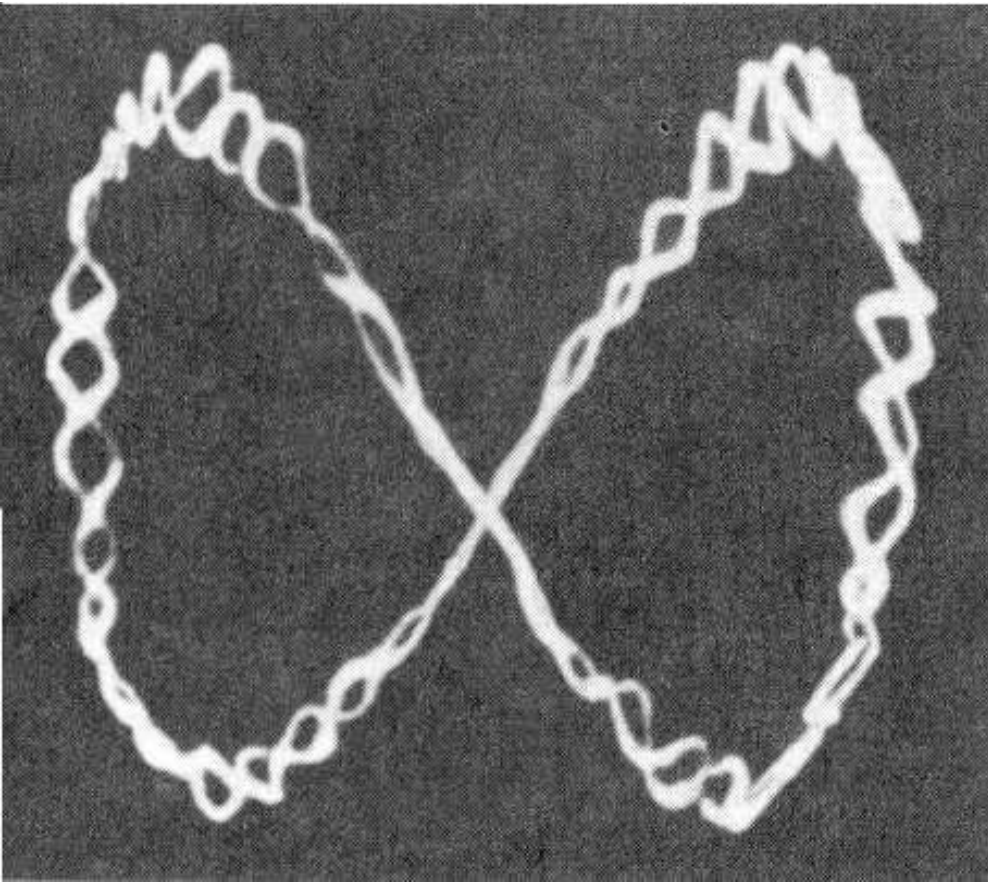
Merci pour votre écoute !

Paul trap

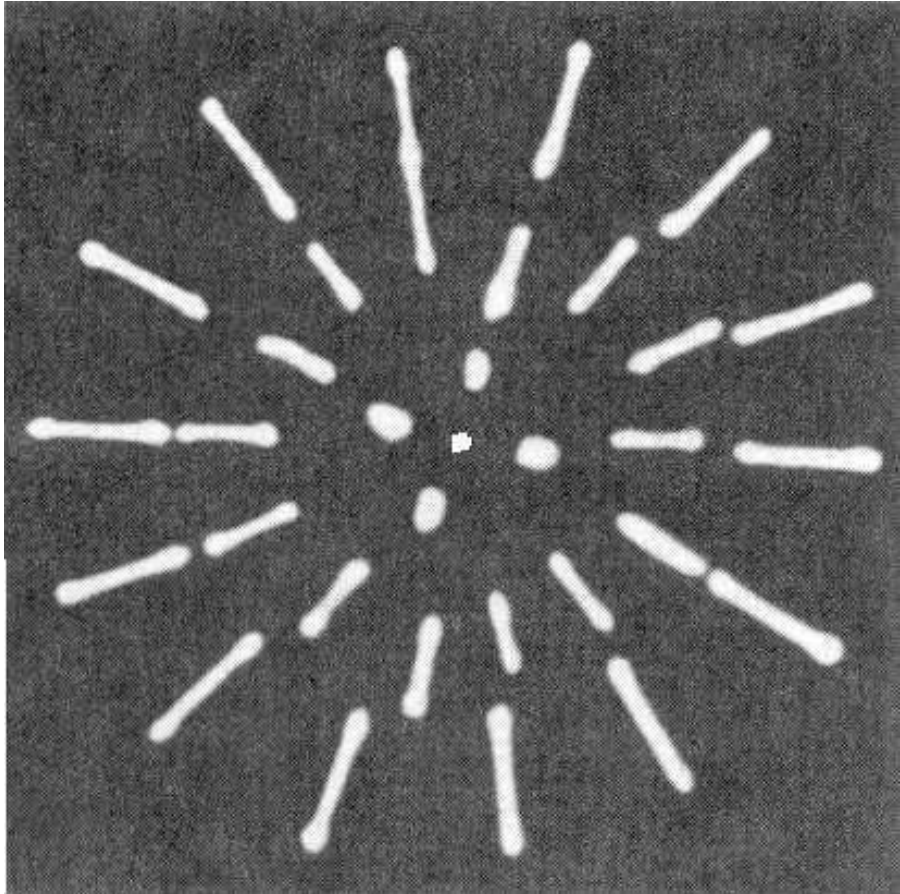


quasi-simple harmonic motion in
pseudo-potential wells D_r and D_z

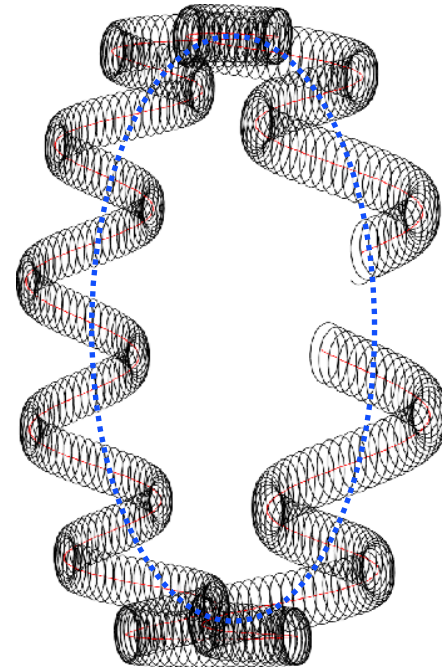
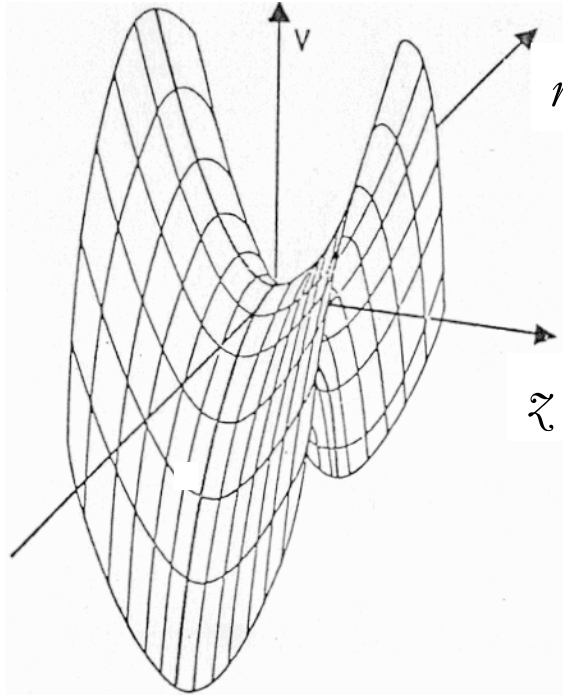
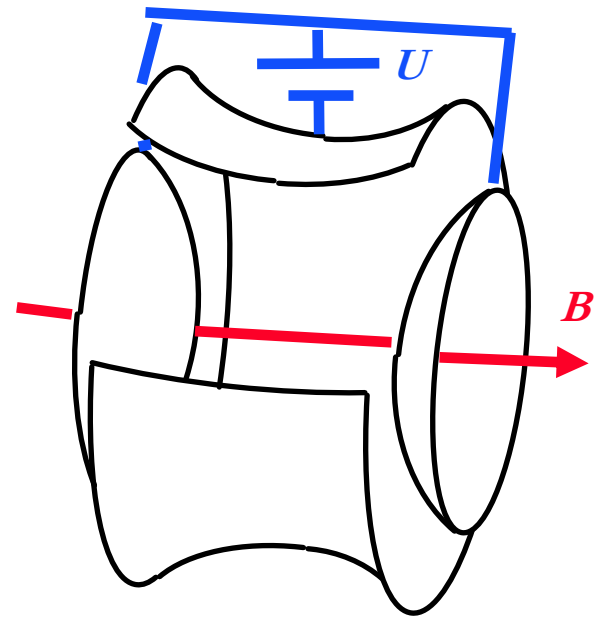
single ion trajectory in Paul trap



cooled ion cloud in Paul trap



Un piège à ions



$$U = 5 \text{ V}$$

$$B = 5 \text{ T}$$

$$f_c (A=100) = 1 \text{ MHz}$$

$$\omega_z \text{ SHM}$$

$$\omega_c = \omega_+ + \omega_-$$

in a quadrupole field



The Nobel Prize in Physics 1989

Norman F. Ramsey, Hans G. Dehmelt, Wolfgang Paul

The Nobel Prize in Physics 1989



Hans Dehmelt



Wolfgang Paul
Bonn University
(1913 - 1993)



The Nobel Prize in Physics 2012

Serge Haroche, David J. Wineland

The Nobel Prize in Physics 2012



Serge Haroche

atomes

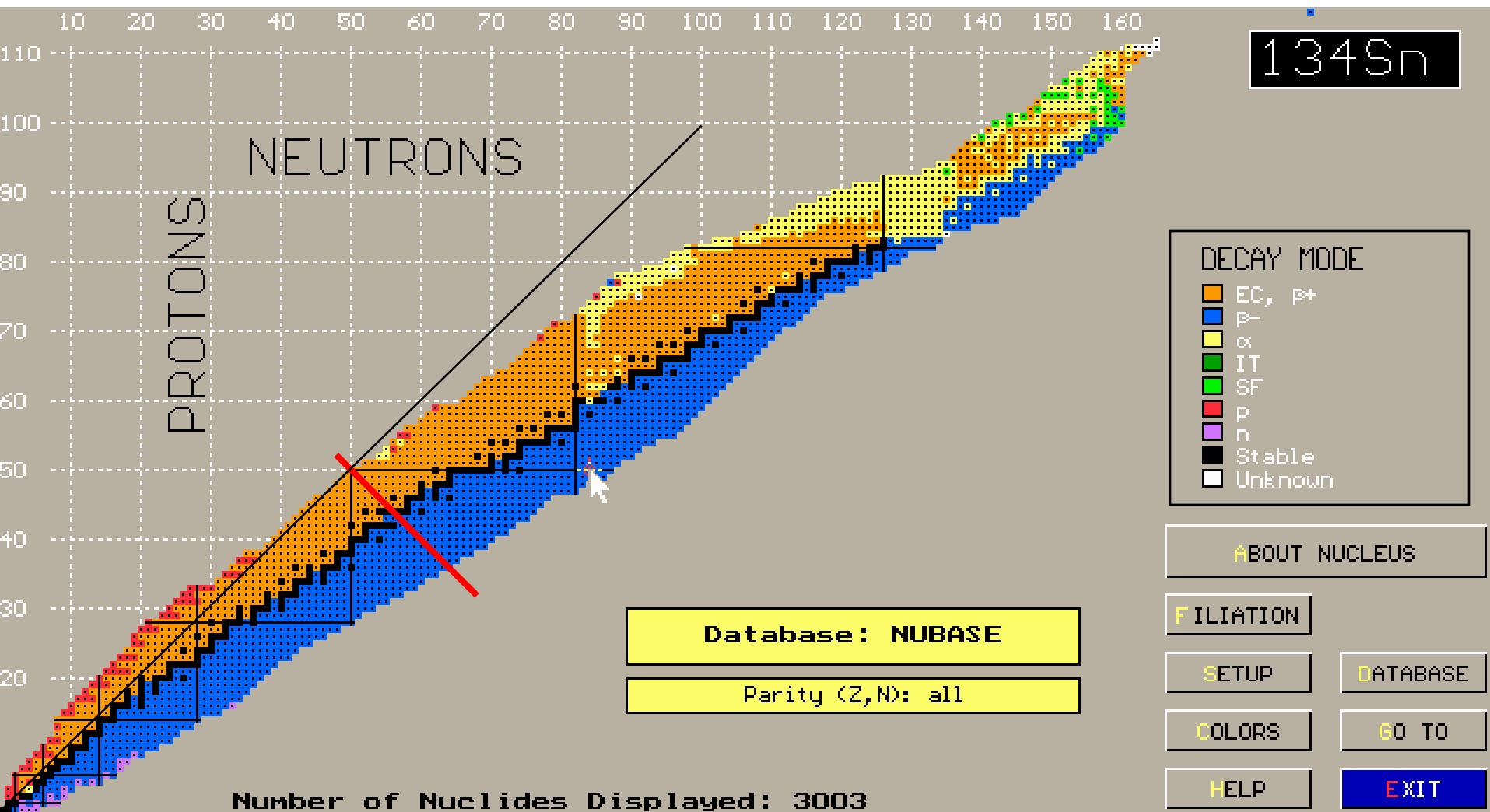


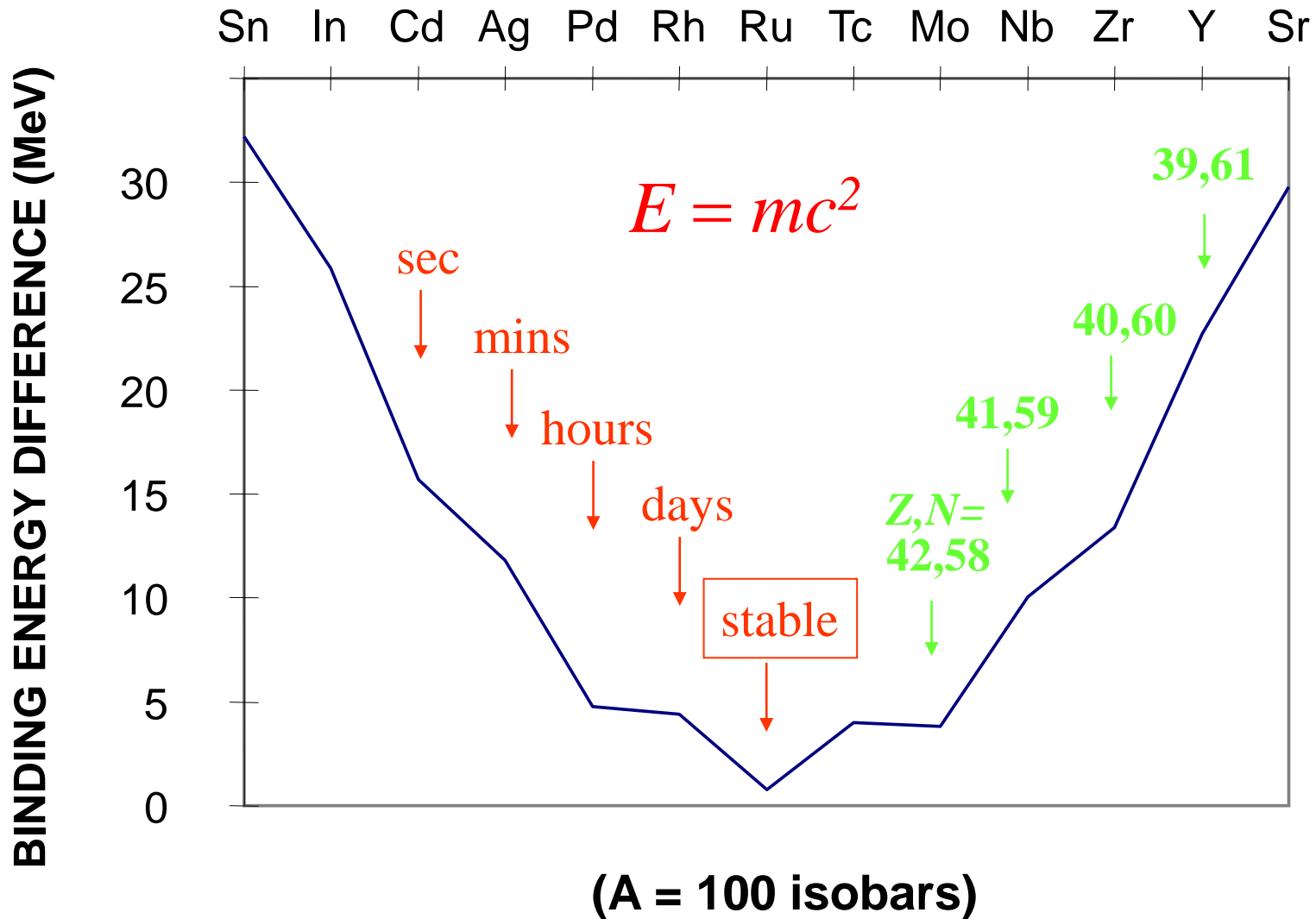
David J. Wineland

ions

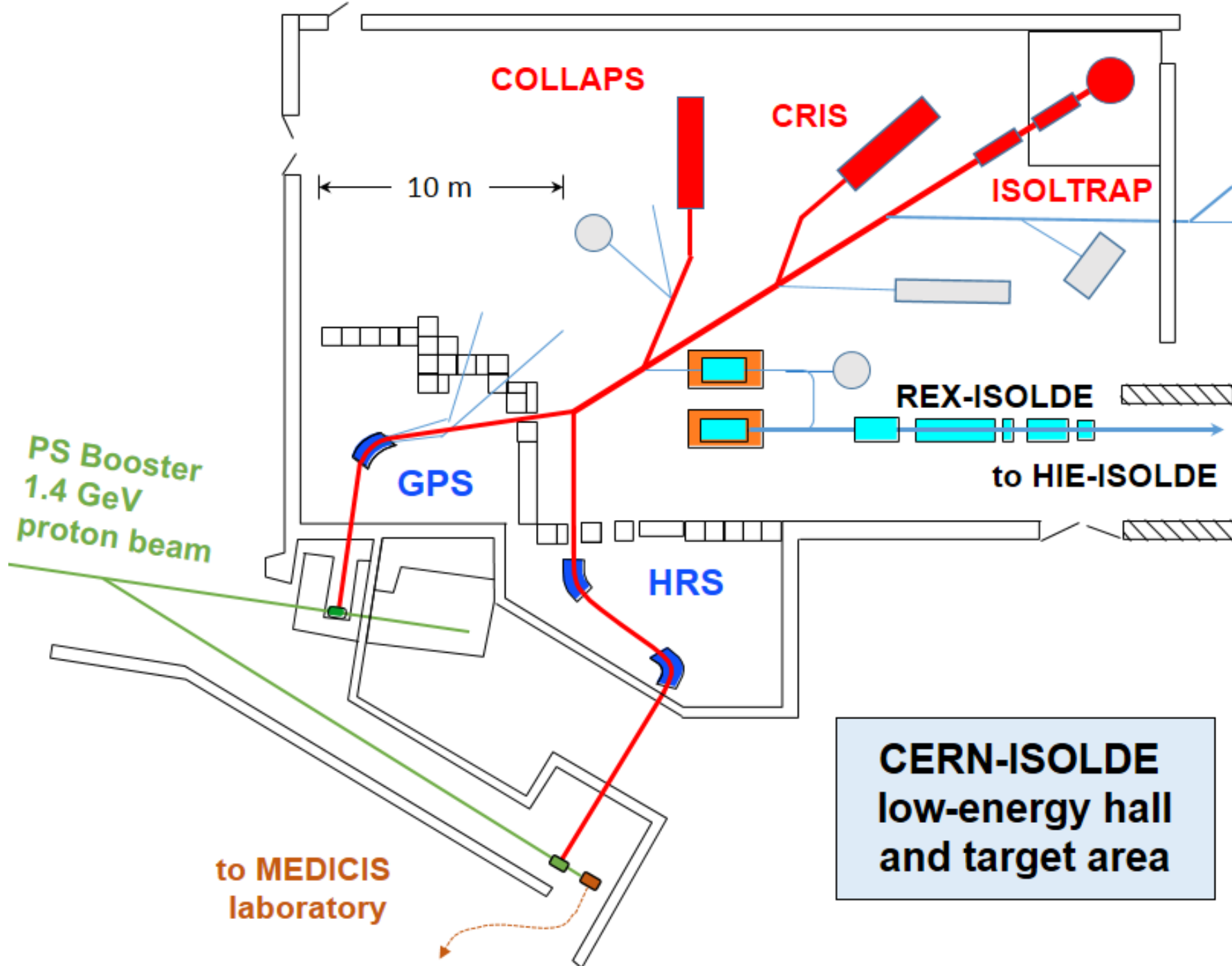
La manipulation et l'étude
des systèmes quantiques

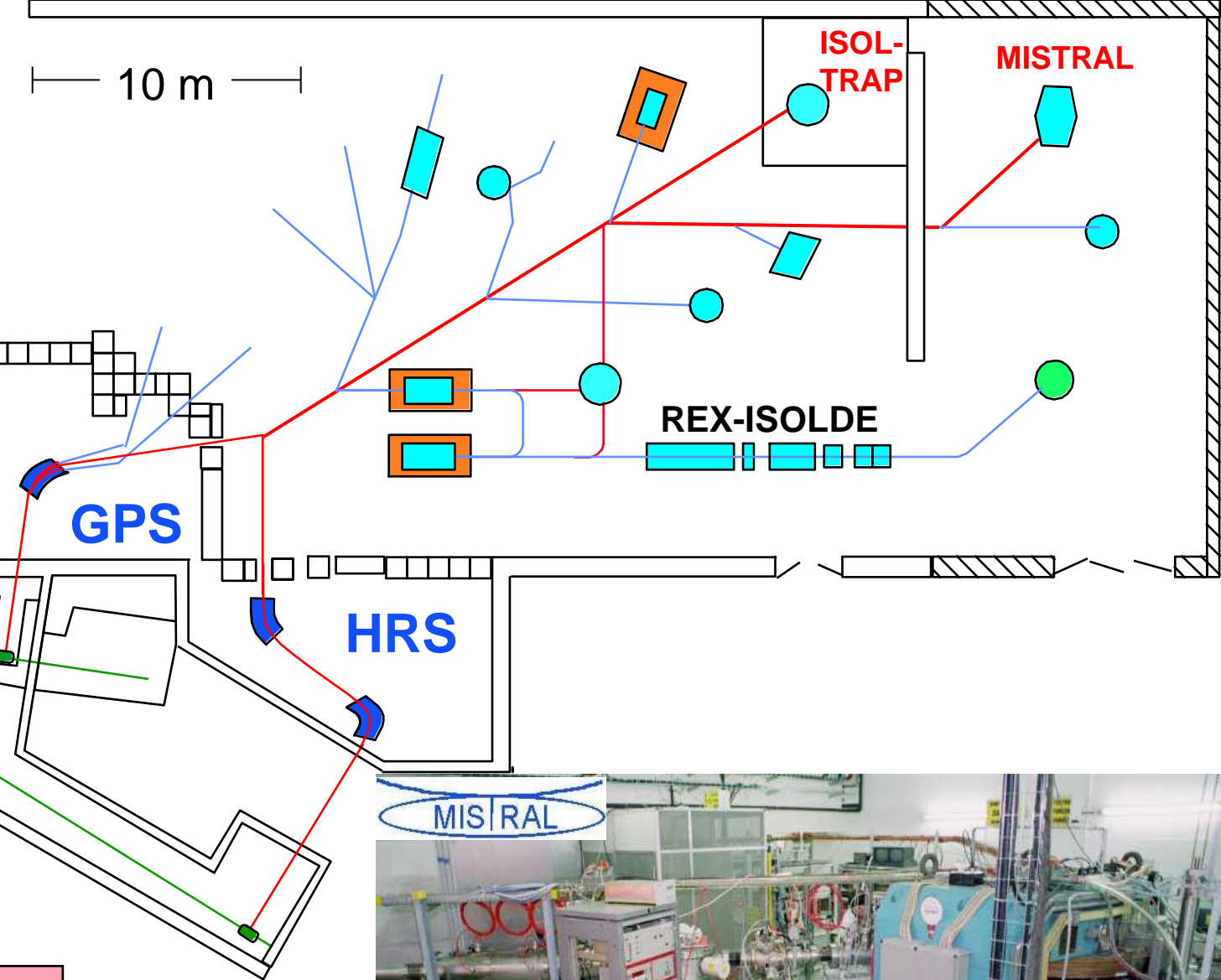
La carte nucléaire





$Z \cdot m_p + N \cdot m_n - BE$ Binding Energy : (énergie de liaison)





ISOLDE
CERN, Geneva

