POLITECNICO
MILANO 1863

DIPARTIMENTO DI ENERGIA

Radioattività, ambiente e … comunicazione

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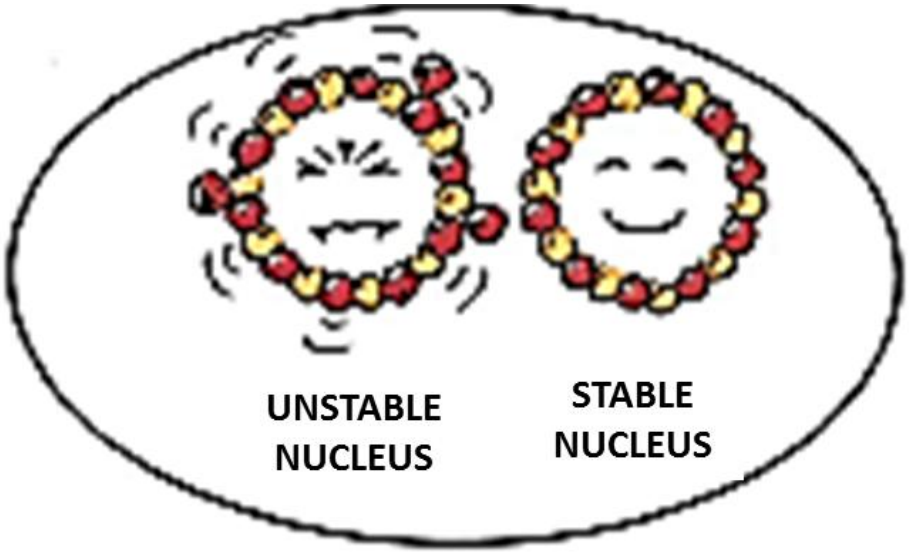
IL DEPOSITO NAZIONALE PER LO SMALTIMENTO DEI RIFIUTI RADIOATTIVI IN UNA LOGICA DI SVILUPPO SOSTENIBILE. ASPETTI PROGETTUALI E FUNZIONALI.

31 Maggio 2018, Milano

SOGIN

Radioattività: nuclei stabili e instabili



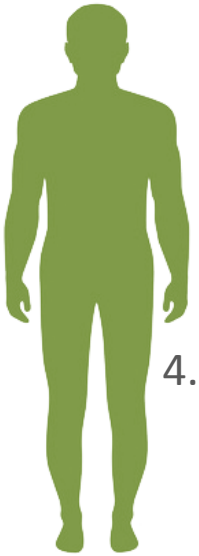
Radioattività di origine naturale

Tufo
1.500-2.500 Bq/kg

Carciofi
300 Bq/kg

Patate
150 Bq/kg

Granito
1.200-1.300 Bq/kg



Adulto
4.000-5.000 Bq

Banane
125 Bq/kg

Mattoni
800 Bq/kg

Acqua piovana
0,5 Bq/kg

Radioattività di origine antropica

ATTIVITÀ ENERGETICHE

- Centrali nucleari
- Impianti di ricerca e del ciclo del combustibile
- Mantenimento in sicurezza degli impianti
- Decommissioning

ATTIVITÀ NON ENERGETICHE

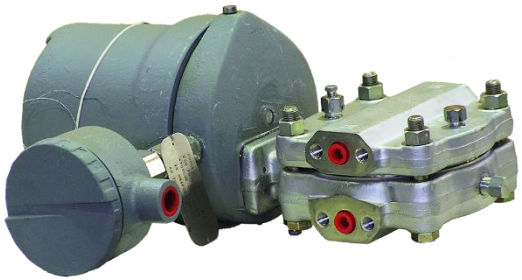
- Medicina
- Industria
- Ricerca
- Altri usi

Tipologie di rifiuti radioattivi

Indumenti e dispositivi di protezione

Scarti metallici

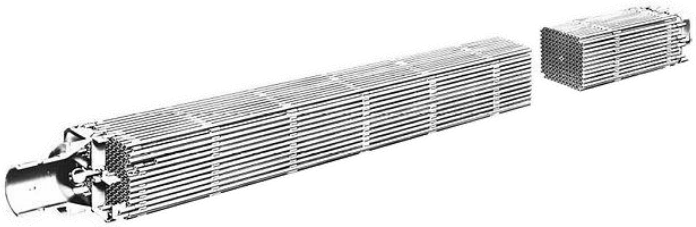
Elementi Impianto Nucleare



Rifiuti medicali

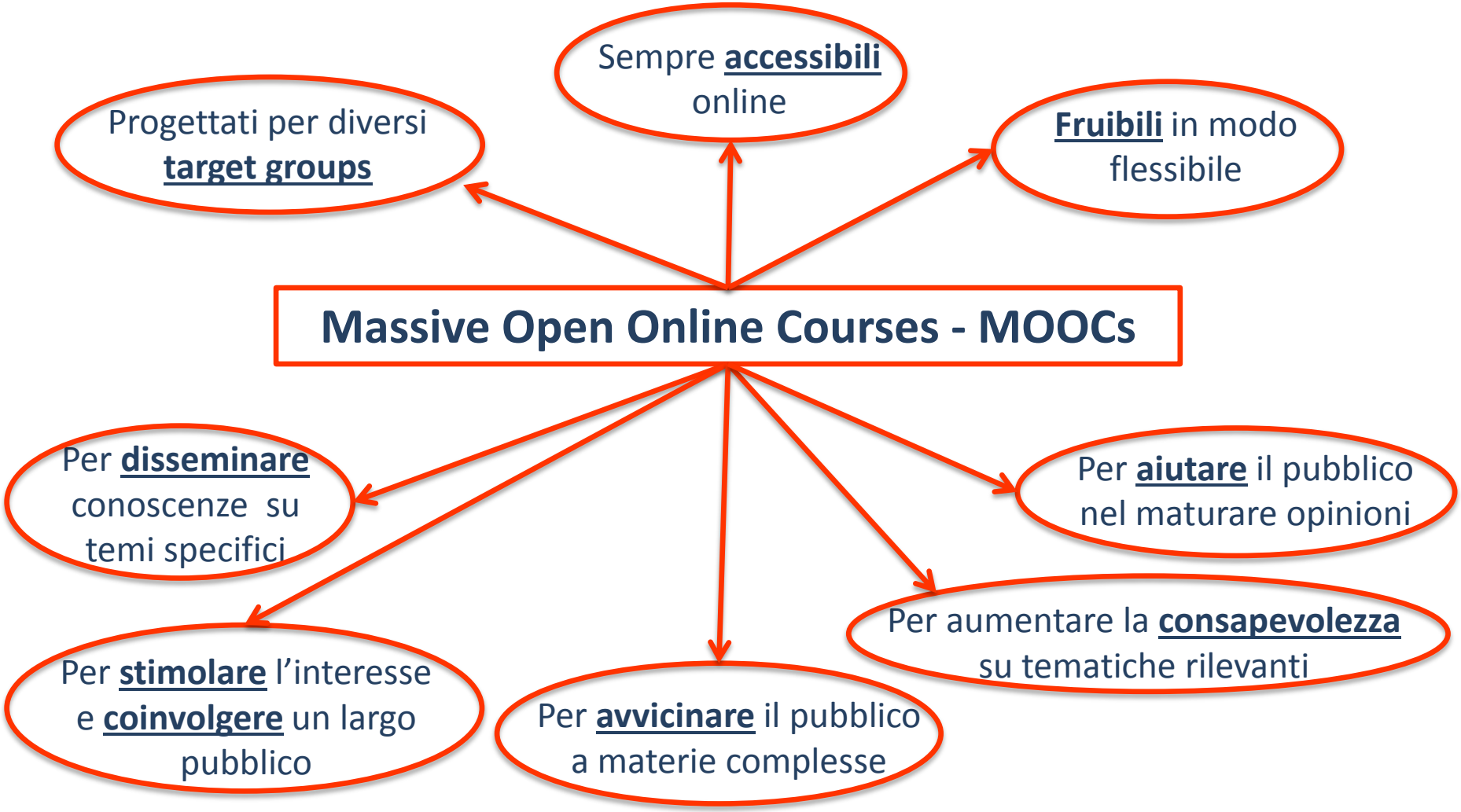
Sorgente sigillata

Combustibile Irraggiato



Altre tipologie

Strumenti innovativi per didattica e comunicazione



Strumenti innovativi per didattica e comunicazione

POLITECNICO MILANO 1863

METID - Metodi e Tecnologie Innovative per la Didattica

POLITECNICO MILANO 1863

Dipartimento di Energia
Nuclear Engineering Division

meet  cinch

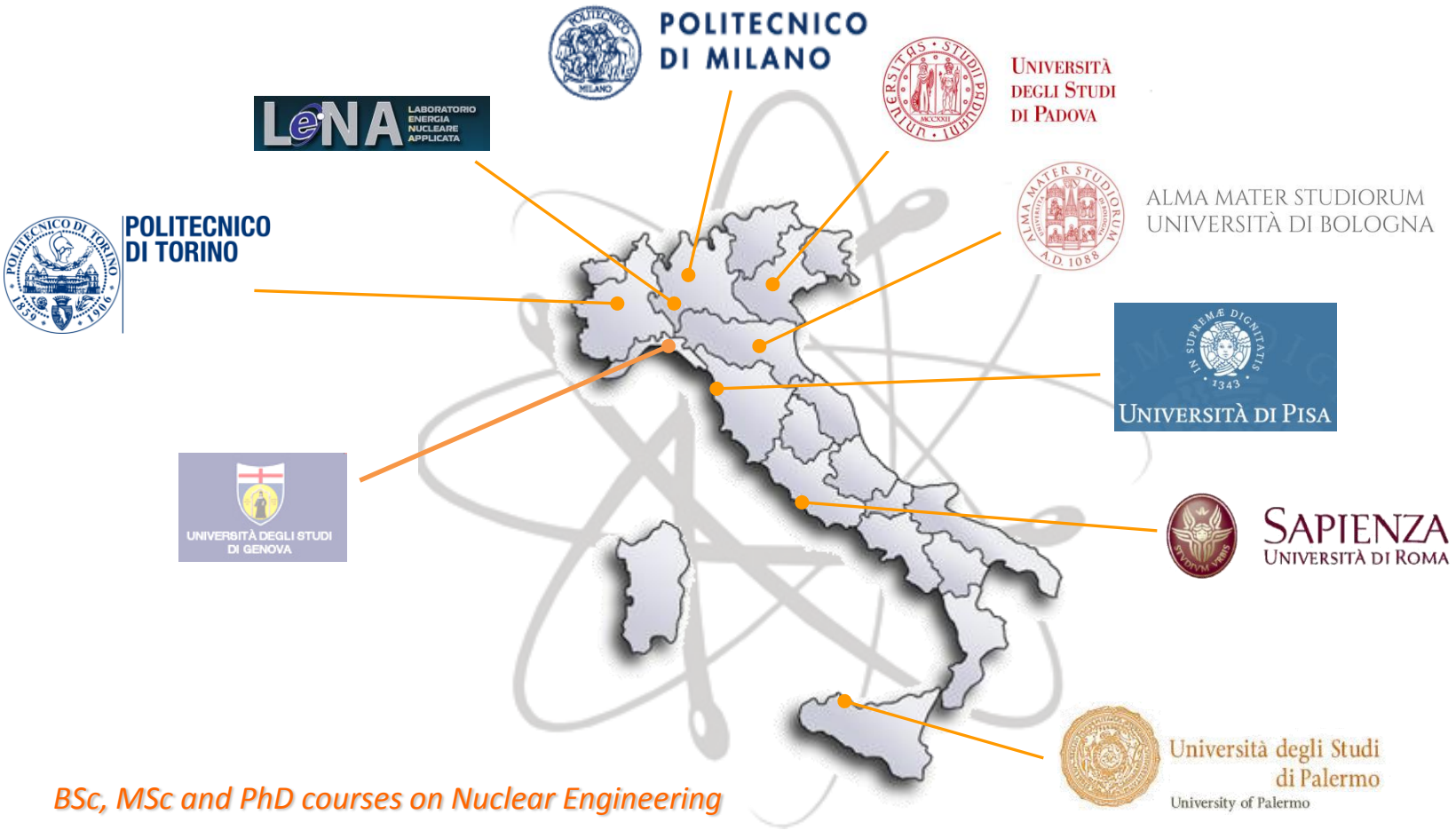
A **M**odular **E**uropean **E**ducation and **T**raining **C**oncept **I**n **N**uclear and Radio**CH**emistry

H2020 EURATOM Project

Un esempio: una lezione introduttiva sulla radioattività e la radiochimica

Italian “nuclear” Universities

CIRTEN - CONSORZIO INTERUNIVERSITARIO PER LA RICERCA TECNOLOGICA NUCLEARE



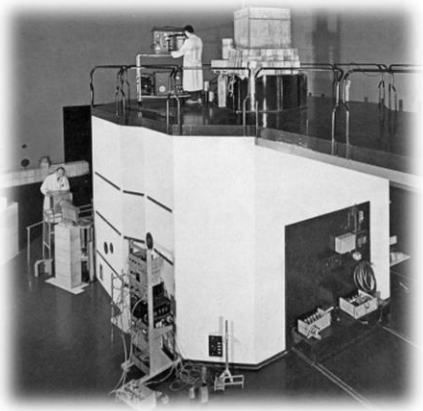
BSc, MSc and PhD courses on Nuclear Engineering

80-100 graduated students/year

Nuclear Engineering @ POLIMI

History

- First educational programme in Nuclear Engineering (1956)
- First research nuclear reactor in Italian Universities (1959)



Today

- Still first MSc in Nucl. Eng. in Italy today (≈50 new students per year), one of the largest in Europe
- English taught MSc in Nuclear Engineering + PhD programme
- The largest **Nuclear Engineering Division** in italian Universities
  (15 professors, 40 temporary researchers and Ph.D. candidates, 11 technicians)
- Brand-new experimental labs (3000 m^2)

Strategy

- National and International projects
- Multidisciplinary groups
- Experimental Labs

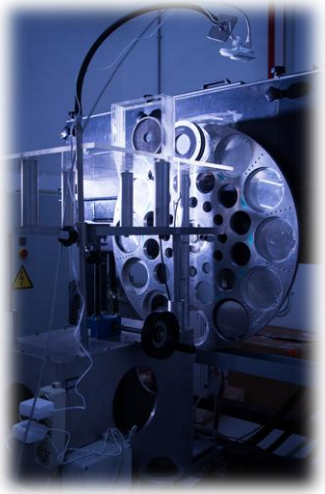
CeSNEF - Nuclear Engineering Division @ POLIMI-DENG

Nuclear Instrumentation and Measurements

- Innovative detection systems for radiation protection and medical applications.
- Thermal and fast neutron fields for neutron dosimeters and detectors.
- Micro- and nano-dosimetry devices for medical applications.

Nuclear Electronics

- Design, characterization and prototyping of electronic instrumentation for radiation detection and measurement.
- ElectroMagnetic Compatibility – ElectroMagnetic Interference (EMC-EMI) for radiation detection and measurements.



Ionizing Radiation Metrology

- Design, development and testing of new radiation detectors.
- X and Gamma rays calibration of nuclear instrumentation (national accreditation ACCREDIA - LAT104).

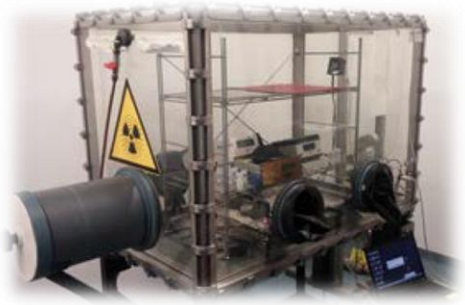
CeSNEF - Nuclear Engineering Division @ POLIMI-DENG

Radiochemistry & Radiation Chemistry

- Partitioning of Actinides for a Closed Nuclear Fuel Cycle.
- Fuel-coolant chemical interaction in GenIV Lead-cooled Fast Reactors.
- Material radio-induced modifications for technological and medical applications.
- Decommissioning: determination of artificial and natural radionuclides (TENORM).

Contaminant Migration & Safeguard

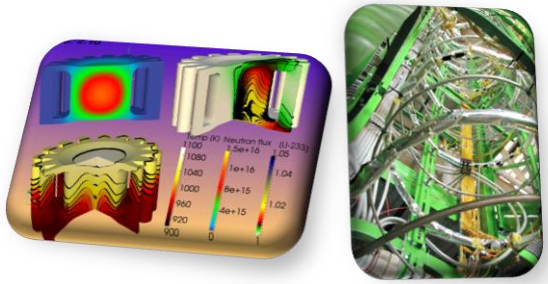
- Contaminants migration processes through natural and artificial media.
- Modelling of contaminants and particles transport.
- Photon and neutron transport for safeguard applications.



Radiation Protection

- National Authorized Body for X, gamma and thermal neutron dosimetry
- Indoor radon air concentration measurement.
- Alpha and gamma spectrometry, Liquid Scintillation Counting.
- Monte Carlo analysis for radiation shielding purposes.

CeSNEF - Nuclear Engineering Division @ POLIMI-DENG

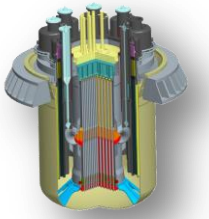


NUCLEAR REACTORS

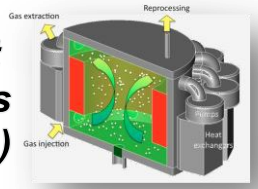
- Experimental Thermal Fluid Dynamics & Passive Safety
- Simulation & Control, Multiphysics, Reduced Order Modelling
- Economics
- Fuel Cycle & Performance, Thermal mechanics

Small Modular Reactors (IRIS, FlexBlue)

Lead Fast Reactors (ADS, ALFRED)



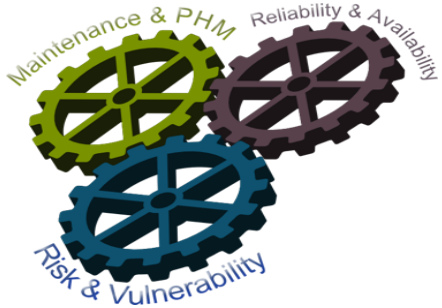
Molten Salt Reactors (SAMOFAR)



LABORATORY OF SIGNAL AND RISK ANALYSIS

Methods:

- Monte Carlo Simulation
- Artificial Intelligence (Neural Networks Fuzzy Logic, Ensemble Systems, …)
- Genetic Algorithms, Differential Evolution
- Graph Theory



Areas of Application

Industries


232.038
+2
+3
+4
Th
90
2-8-18-32-18-10-2
ank
Yo
238.029
+2
+3
+4
+5
+6
U
92
2-8-18-32-21-9-2