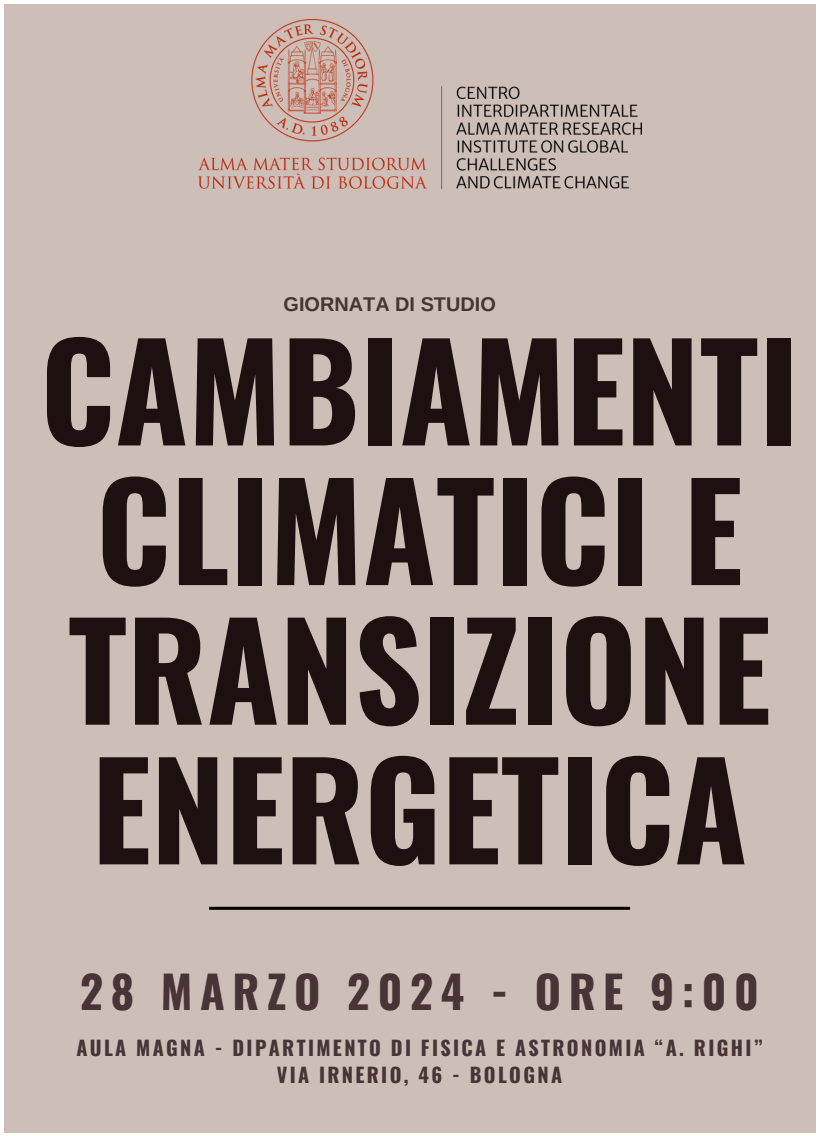
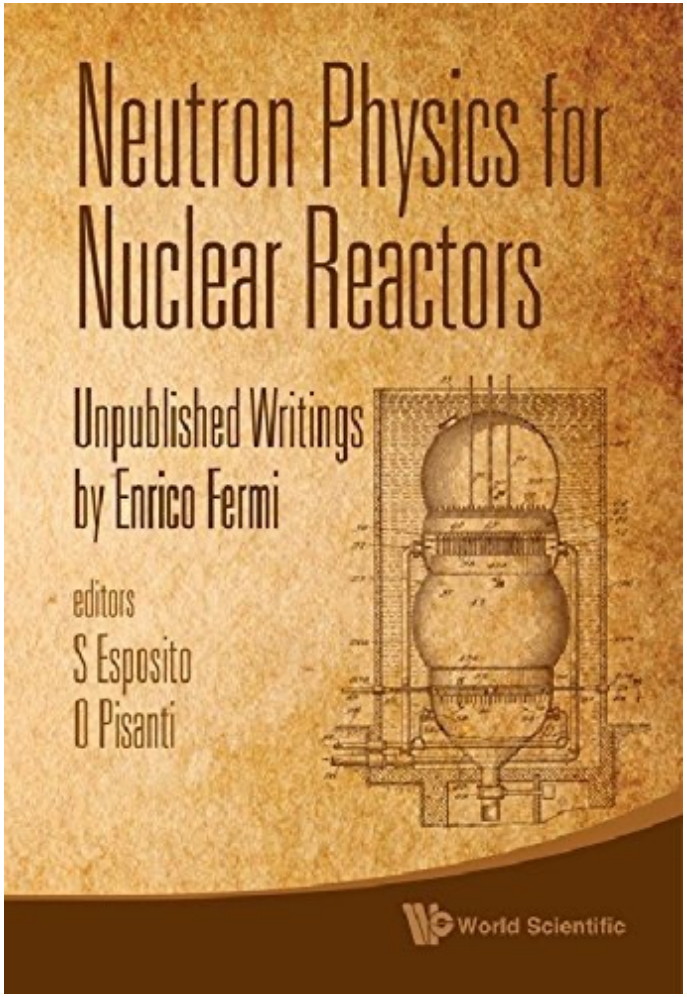


FISICA DEI REATTORI NUCLEARI

Marco Sumini
Dipartimento di Ingegneria Industriale - UNIBO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PART I: CHAPTERS 1 TO 8

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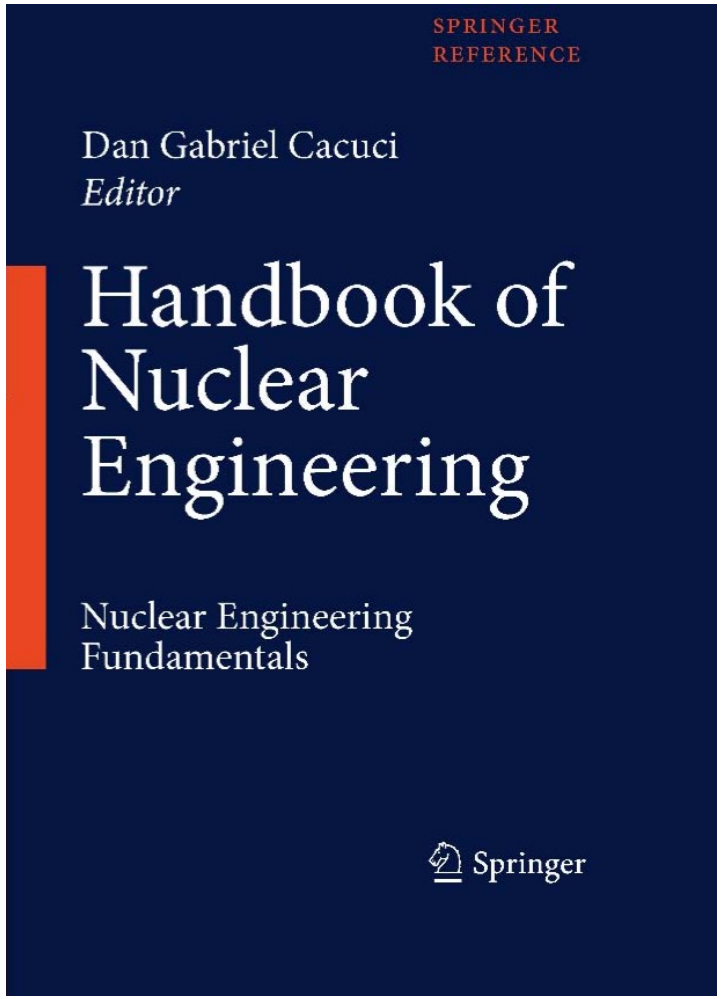

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Jess C. Gehin, PhD
Director, Consortium for Advanced Simulation of Light Water Reactors

ANS M&C + SNA + MC 2015
Nashville, Tennessee
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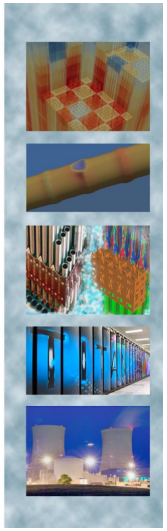

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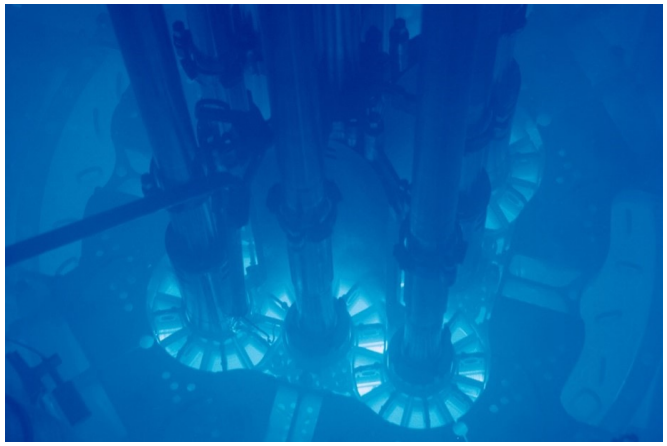
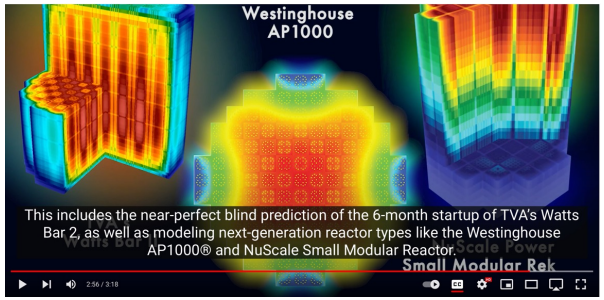




- MPACT – 3D Pin-Resolved Neutron Transport
- CTF – Whole-Core Sub-Channel T/H
- ORIGEN – Isotopic Depletion and Decay
- Bison – Advanced Fuel Performance
- MAMBA – 3D Pin-Wise CRUD Growth
- Shift – Hybrid Monte Carlo Particle Transport
- VERAView – VERA Data Visualization Tool
- VERA Quality Control and Releases
- CASL Applications and Validation

https://www.youtube.com/watch?v=Epelitvg49w&t=198s

JHR: Courtesy of CEA

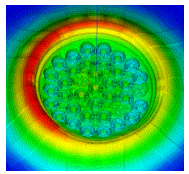
1 JHR hosting capabilities

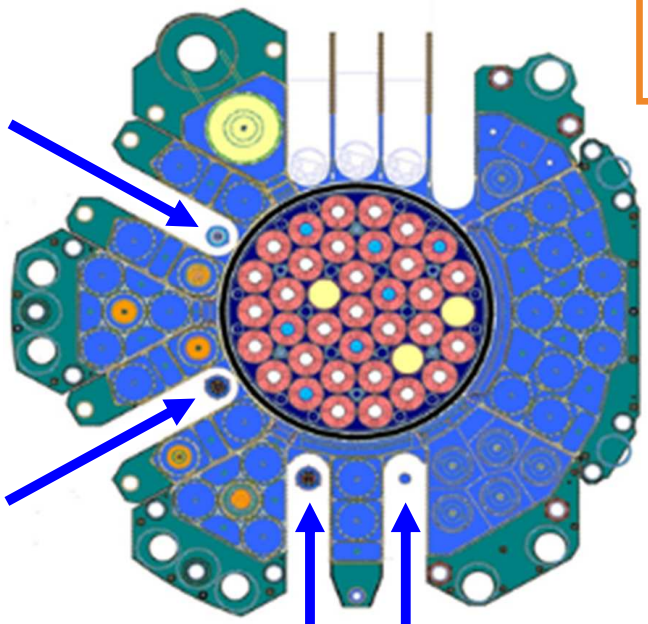
In reflector
Up to 3.5E14 n/cm².s (th)

Fixed irradiation positions (Φ100 mm & Φ200 mm) and 4 displacement systems

LWR fuel experiments + Material ageing (low ageing rate Exple : RPV material)

Thermal neutron flux



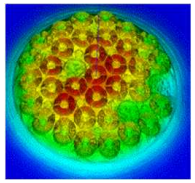


In core
Up to 5.5E14 n/cm².s (E> 1 MeV)
Up to 1.E15 n/cm².s (E> 0.1 MeV)

7 small locations (Φ ~ 32 mm)
3 large locations (Φ ~ 80 mm)

Material ageing (high ageing rate) + Gen IV fuel experiments

Fast neutron flux

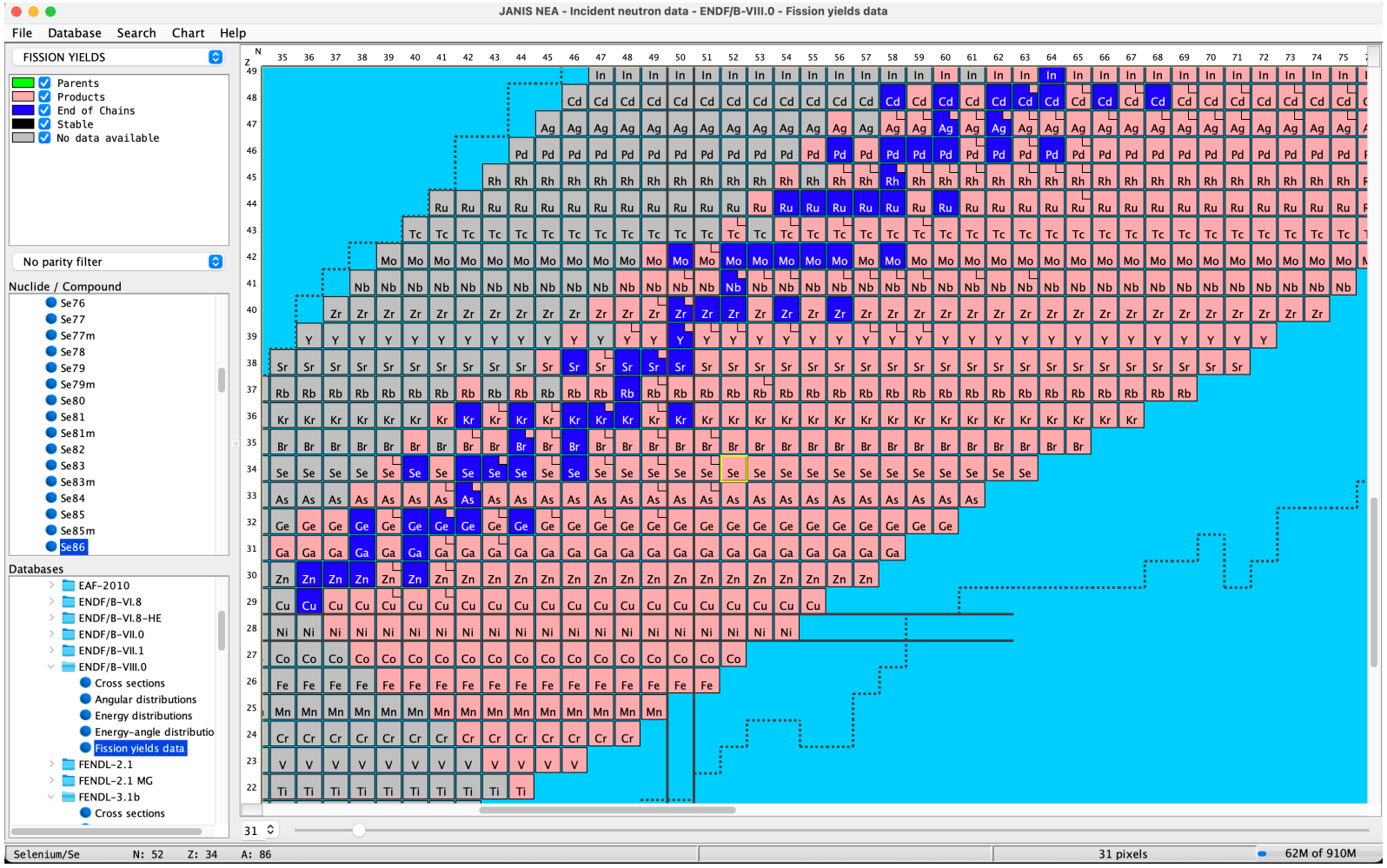


Displacement devices
450 mm stroke
Vmax = 6 mm/s

→A large range of neutron fluxes and spectra

JHR: Courtesy of CEA

In Factory operation: Mounting of the reflector


JANIS NEA - Incident neutron data - ENDF/B-VIII.0 - Fission yields data
File
Database
Search
Chart
Help
FISSION YIELDS
Parents
Products
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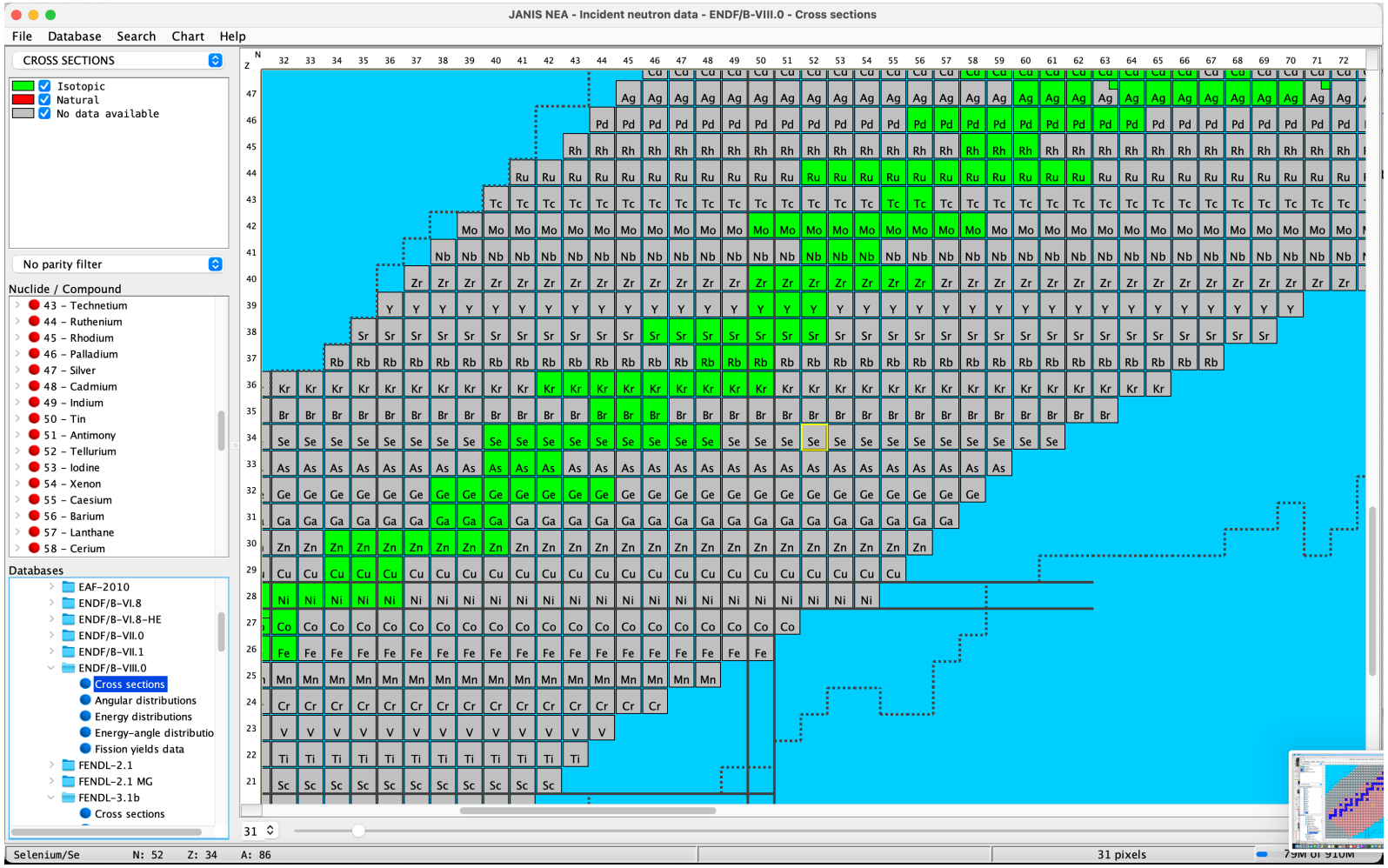
Nuclide / Compound
Se76
Se77
Se77m
Se78
Se79
Se79m
Se80
Se81
Se81m
Se82
Se83
Se83m
Se84
Se85
Se85m
Se86
Databases
EAF-2010
ENDF/B-VI.8
ENDF/B-VI.8-HE
ENDF/B-VII.0
ENDF/B-VII.1
ENDF/B-VIII.0
Cross sections
Angular distributions
Energy distributions
Energy-angle distributio
Fission yields data
FENDL-2.1
FENDL-2.1 MG
FENDL-3.1b
Cross sections
N
Z
31
Selenium/Se
N: 52
Z: 34
A: 86
31 pixels
62M of 910M


JANIS NEA - Incident neutron data - ENDF/B-VIII.0 - Cross sections
File
Database
Search
Chart
Help
CROSS SECTIONS
Isotopic
Natural
No data available
No parity filter
Nuclide / Compound
43 - Technetium
44 - Ruthenium
45 - Rhodium
46 - Palladium
47 - Silver
48 - Cadmium
49 - Indium
50 - Tin
51 - Antimony
52 - Tellurium
53 - Iodine
54 - Xenon
55 - Caesium
56 - Barium
57 - Lanthane
58 - Cerium
Databases
EAF-2010
ENDF/B-VI.8
ENDF/B-VI.8-HE
ENDF/B-VII.0
ENDF/B-VII.1
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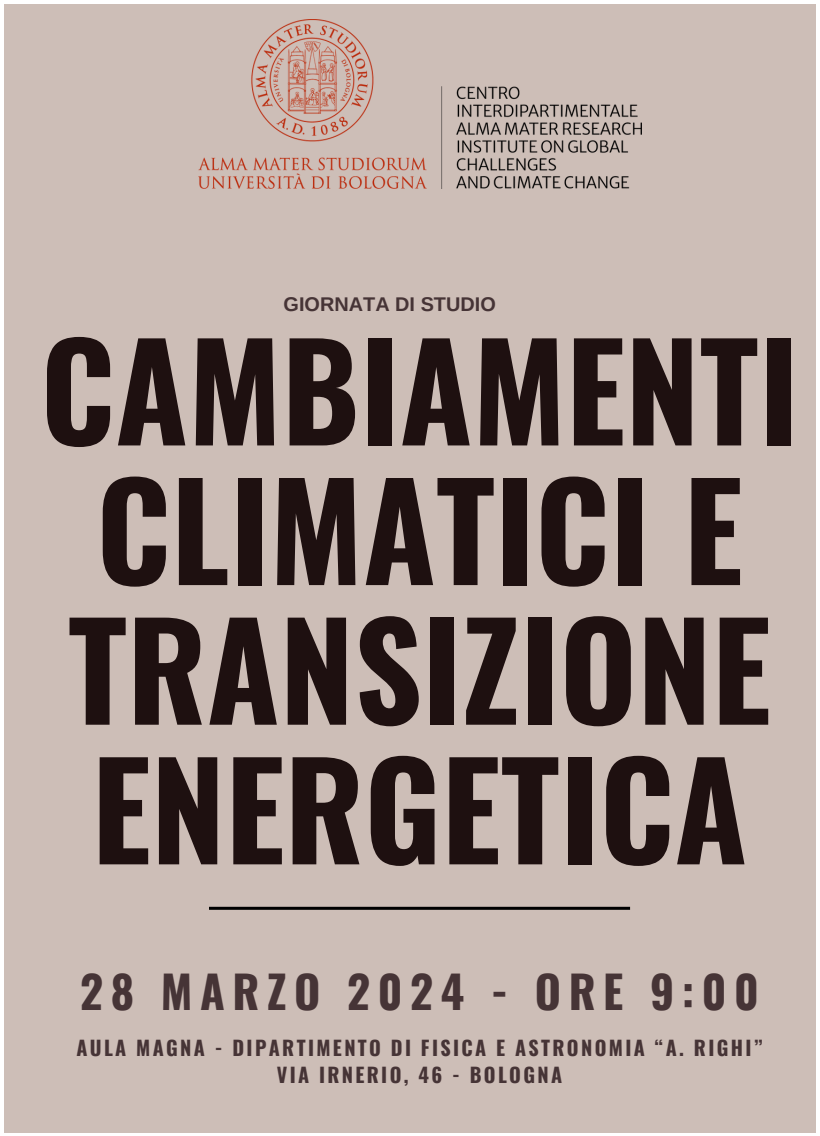

Grazie per l'attenzione!