

WINTER SCHOOL

**Advances in characterisation and modelling
of polymer ageing applied to electrical cables
in Nuclear Power Plants**



15-17 November 2021
Bertinoro, Italy

Pre-registration until 18 October here
**No fee for participation – only 69€/day for
accommodation and full pension**

PROGRAM

Day 1 – Monday,

November 15:

Introduction - basic knowledge on cables (afternoon)

- From the conception to the qualification of cables (NEXANS)
- Multi-scale analysis of the radio-thermal aging of XLPE cable insulation in nuclear environment (ENSAM)

Day 2 – Tuesday,

November 16: Condition

Monitoring Techniques (microscale and macroscale)

- Cable ageing management program, activities at NPPs (UJV)
- Complementarity of three techniques to understand the physico-chemical evolution of polymers in radio-oxidant conditions (IRSN/AMU)
- The use of the EPR technique to assess the ageing of polymer composites (INCT)

- Mechanical tests for ageing evaluation (VTT)
- Dielectric spectroscopy for ageing assessment (UNIBO)
- THz technique for evaluation of ageing of NPP cables (IZFP)
- TDR/FDR technique for evaluation of ageing of NPP cables (CEA)
- Common dinner

Day 3 – Wednesday,

November 17: Ageing

modelling of NPP cables

- Kinetic modelling of polymer ageing (ENSAM)
- Virtual polymer (EDF)
- Multiscale modelling of electrical properties (UNIBO)
- *Ab initio* modelling of polymer (CEA)
- Molecular dynamics and finite element modelling of mechanical properties (VTT)
- THz electrical response modelling on the micro- and macroscale (IZFP)
- Practical sessions (will be specified later).



VENUE & HOW TO GET THERE

The University Residential Centre of Bertinoro

Via Frangipane, 6 – Bertinoro, Italy

90km from Bologna

IMPORTANT: EU Digital COVID Certificate required to access the school and restaurants. [More details about entry in Italy here.](#)

Catering for lunches and coffee breaks on the three days of the School as well as the shuttle buses from and to Bologna are paid by the organisers.

Participants only need to pay their accommodation on site and travel costs to Bologna. A dedicated page will be open in September to book their stay on site (69€/day incl. room, breakfast & dinner).

We recommend landing at **Bologna airport**, or Milan airport and taking the train to Bologna.

A **shuttle will be organised** to pick up participants from Bologna bus/ train station on Monday 15th morning (reachable from airport). Participants can also take the train from Bologna to the closest train station (Forlì) and take a bus or taxi from there to Bertinoro. From Forli train station get on the bus line 92 until downtown Forlimpopoli, then bus line 121 to reach Bertinoro.

After the end of the school, on Wednesday 17th evening a shuttle will go to Forlì train station and on Thursday 18th morning to Bologna.



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