



# PERLA and TEMPEST: JRC experience in qualification and testing of safeguard instrumentation

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# Overview

- **Qualification and testing of nuclear instruments**
- **The TEMPEST laboratory for vulnerability testing**
- **The PERLA laboratory for performance assessment**
- **Extrapolation to equipment for homeland security**



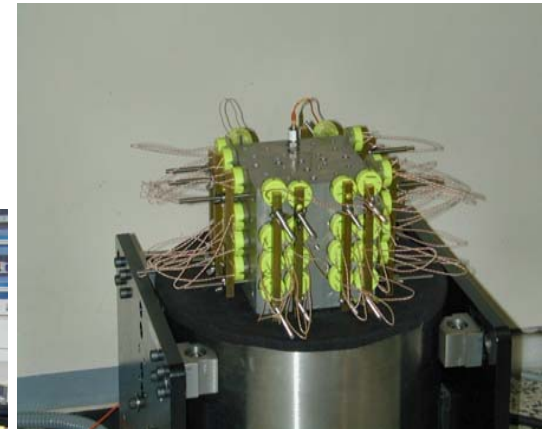
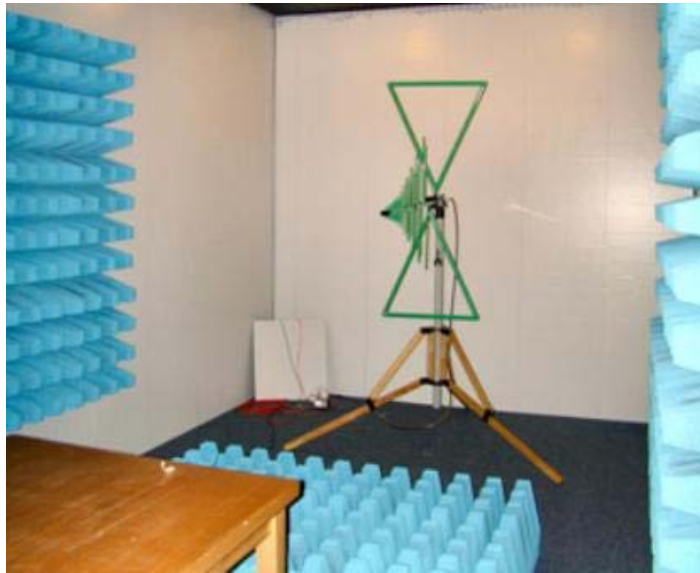
# Requirements for nuclear instrumentation

- **The instrument should be able to operate in harsh conditions (environmental, radiation, vibration,...)**
- **The instrument should not be vulnerable to external influences (electro-magnetic, mechanical,...)**
- **The instrument should not interfere with other instruments (e-m emissions)**
- **The performance of the instrument must be assessed vs. well-characterised reference standards**



# Testing in TEMPEST (ISO-17025)

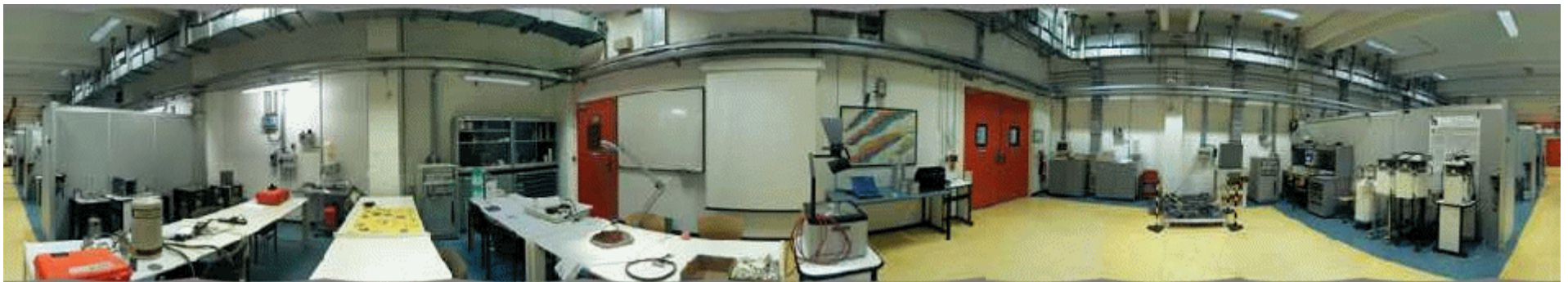
- Set up of Test Procedures for Safeguards Equipment
- Thermal and Humidity Tests
- Mechanical Vibrations and Transport Simulation
- Electromagnetic Compliance and Immunity Tests
- In Field Measurements





# The PERformance LABORatory

- R&D on new NDA equipment for nuclear safeguards
- Performance assessment of NDA techniques and calibration of instruments
- Training of nuclear inspectors (Euratom and IAEA)





# The PERFORMANCE LABORATORY

- **Certified well-characterised reference standards of fissile materials (LEU, HEU, Pu, MOX)**
- **Monitored measurement conditions:**
  - climatic chamber
  - neutron background monitors
- **QA: archiving and traceability of measurement results**
- **Large variety of NDA instruments**
- **Neutron generator facility to study radiation damage and single upset event**





# Requirements for homeland security

- **Similar requirements than safeguard equipment**
- **Equipment size could be a problem (f.i. portals)  
=> components vs system testing**
- **For nuclear instruments, testing needs use of real nuclear material**
- **For detection of explosives or chemicals, it is possible to use simulants**
- **Commercial equipment => laboratory certification**