# MADISON Device

**Description**
A loop device for irradiation of LWR fuel samples in normal conditions of power reactors
- In JHR reflector
- On displacement system
- Heavy components in cubicle

**Type of fuel sample**
All type of LWR fuel sample
- PWR / BWR and VVER fuel samples
- UO2 fuels (up to 7% in U⁵)
- MOX fuels (up to 15% in Pu/(U+Pu))
- Fresh fuels
- High burn up fuels (120GW.j/t)

**Carrying capacity**
Flexible loop with a large carrying capacity
- 4 fuel rods of LHGR ≤ 400W/cm and clad diameter ≤ 10 mm
- 3 fuel rods of LHGR ≤ 400W/cm and clad diameter ≥ 10 mm
- 7 fuel rods of LHGR ≤ 200W/cm

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**Type of experiment**
Characterization and qualification of fuel samples
- Fuel behaviour vs BU and LHGR
- Long-term irradiations
- (creep, corrosion, crack propagation...)
- Comparison investigations
- Re-irradiation before ramps

**Measurements**
- Temperature, pressure, water flow
- Precise thermal balance (5%)
- Clad elongation (LVDT)
- Other measurements possible (Fission Products, Non destructive tests...)

**Fluid environment**
Representative of power reactors
- Thermal-hydraulics of PWR, BWR or VVER
- Chemistry of PWR, BWR or VVER

**Performances**
Good homogeneity between any 2 identical fuel rods
- 3-5% max. heterogeneity (in case of 4 samples) of linear power
- For all type of fuels / Burn up
- Use of thin neutron screens