<table>
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<tr>
<th>Country</th>
<th>Research reactor</th>
<th>Power Type</th>
<th>Fuel</th>
<th>Coolant</th>
<th>Moderator</th>
<th>Reflector</th>
<th>Irradiation positions:</th>
<th>Test configuration</th>
<th>Instrumentation and control</th>
<th>Auxiliary facilities</th>
<th>On-site PIE capabilities</th>
<th>Design, manufacturing, disposition, shipping, waste handling and other capabilities</th>
<th>Method of access and degree of utilization</th>
<th>Miscellaneous and readiness for material testing research (MTR)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Argentina</td>
<td>RA-10 (planned)</td>
<td>30 MW</td>
<td>Open-pool</td>
<td>Square array</td>
<td>Light water as coolant and moderator</td>
<td>Heavy water reflector</td>
<td>6 in-core irradiation channels Ø 5–8 cm 12–65 cm long</td>
<td>Loop facility for testing PHWR and PWR fuels, linear power 500 W/cm and a maximum heat flux of 130 W/cm² in steady state conditions (3 rods) and 600 W/cm and 150 W/cm² in ramp conditions (1 rod) Temperature 320°C (max.) Pressure 15bar (max.)</td>
<td>In pile temp, pressure, stress, strain</td>
<td>Pneumatic system for NAA and long irradiation capsules, cold source and beams guides (cold and thermal), Isotope production, neutron transmutation doping (NTD)</td>
<td>Hot cell for fresh and irradiated experimental material in-pool neutron radiography facility for irradiated devices inspection</td>
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**MYRRHA**  
Planned to be operational by 2024

<p>| 65–100 MW ADS system capable of operating in critical mode | Max 35 wt% enriched MOX fuel | Pb-Bi eutectic (LBE) coolant | 2 layers dummy FA (LBE and YZrO) | 6+1 instrumented In-pile-sections (IPS) positions, 21 additional positions for inserts from top available | Core height 600 mm, irradiation space: hexagonal, ID 101.5 mm | Total flux $10^{15}$ n-cm$^{-2}$s$^{-1}$ | Fast flux (&gt;0.75 MeV) $4.2 \times 10^{14}$ n-cm$^{-2}$s$^{-1}$ | dpa/year: 23 in IPS, up to 30dpa/year below target zone in ADS mode |
| Test configuration is IPS design dependent | Sample surface temperature range 100–650°C | $\Delta T$ over sample &lt; 30°C | IPS coolant possibilities: inert gas (He, Ar, CO$_2$…), water, liquid metal (LBE, Pb, Na) | Possibilities for material testing, fuel tests, instrumentation tests, etc. | Instrumentation &amp; control is IPS dependent |
| On-site hot cells available | On site PIE facilities | IPS design group and IPS manufacturing/assembly in-house | Waste handling &amp; shipping possible | Via MYRRHA consortium | Commercial access | Scientific merit (via PAC) | Primary mission: demonstration | No paper |</p>
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<tr>
<td>India</td>
<td>HFRR</td>
<td>Open pool</td>
<td>Plate type</td>
<td>Mineralised water</td>
<td>Heavy water reflector tank</td>
<td>Irradiation position, thermal neutron (&lt;0.621 eV), Epithermal (0.625 eV–821 keV), Fast neutron (&gt;821 keV)</td>
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<tr>
<td></td>
<td></td>
<td>30 MW (Th)</td>
<td>Plate type</td>
<td>U3Si2</td>
<td>19.75%</td>
<td></td>
<td>In-core water hole, 6.7 x 10^14, 3.4 x 10^14, 1.8 x 10^14</td>
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<td>dispersed in AI matrix with a clad of AI-alloy</td>
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<td>In-core peripheral water holes, 4.4 x 10^14, 2.4 x 10^14, 1.3 x 10^14</td>
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<td>Irradiation holes in D2O, 7 cm away from core edge, 3.7 x 10^14, 6.0 x 10^13, 1.2 x 10^13</td>
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<td></td>
<td>Irradiation holes in D2O, 20 cm away from core edge, 2.9 x 10^14, 5.0 x 10^13, 1.7 x 10^12</td>
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<th>Test environment temperature and pressure range</th>
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<td></td>
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<td>Temperature, pressure, fluence</td>
<td>Six beam tubes NAA facility</td>
<td>Hot cells Planned</td>
<td>Necessary in-house expertise exists</td>
<td>Material irradiation facility planned</td>
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<td></td>
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<td></td>
<td>NTD silicon facility</td>
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<tr>
<td><strong>JULES HOROWITZ</strong></td>
<td><strong>High performances material testing reactor</strong></td>
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<tr>
<td>100 MW Light-water reactor, slightly pressurized core U3Si2 Al fuel (19.75% or 27%)</td>
<td>10 cycle per year 25 days cycle</td>
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<td>20 irradiation positions (about 10 for fuel experiments; 10 for material experiments)</td>
<td>Experimental loops under developments allowing to represent thermo hydraulic conditions of PWR, BWR and WWER (nominal, incidental-ramps and accidental scenario – LOCA – are considered)</td>
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<td>Fast flux (E &gt; 0.1 MeV): 5.5 E14 n·cm⁻²·s⁻¹</td>
<td>For material corrosion loop to address irradiated assisted stress corrosion cracking (IASCC)</td>
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<tr>
<td>Thermal flux 5.5 x 10¹⁴ n·cm⁻²·s⁻¹ Material ageing: up to 16 dpa/year – max value in specific location</td>
<td>Sodium loop under feasibility for GENIV support</td>
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<td>Diameter available in the core: 30 mm (3 possibility to 80 mm)</td>
<td>Many up to date modern on-line instrumentation to measure: thermal and fast neutron flux, gamma heating, elongation mono and bi-axial, stress strain, temperature, pressure,… On-line fission gas release analysis</td>
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<tr>
<td>Outside the core in displacement system (6 available) flexibility</td>
<td>Non-destructive equipment to perform X and Gamma analysis (tomography) on fuel in the reactor pool, in the storage pools and in hot cells No neutron beam available</td>
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<td>Non-destructive analysis: X and Gamma measurement (tomography) – elongation via LCDT… 4 hot cells to perform first level of PIE before sending sample to Cadarache Hot Labs (or others)</td>
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<td>Modern facility with all support activities such as: design of new experimental device, transport, waste management</td>
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<td>JHR is an material testing research steer and fund by an International Consortium (12 members at the end of 2013) According to the Consortium agreement, possibility for non-member to have access to JHR experimental capacity</td>
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<td>Advanced Under construction Plan to be in full operation by the end of this decade Multi purpose with primary mission – material testing</td>
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