Technical specifications

General specifications
- Total electric power: 42 kWe
- Total available radiation power: 14 kW
- Radiation peak flux 3.6 MW/m^2; radiation flux density 2.7 MW/m^2 (within a 20mm in diameter circular area) at 140 A rated current

Lamps
- 7 Xenon short-arc lamps (doped tungsten electrodes) with elliptical reflectors
- Electrical power per lamp 6 kW (35 V, 170 A)
- Operating pressure about 40 bar
- Ignition voltage 40 kV
- Average luminance 160000 cd/cm^2 (luminous area w×h 1.9 mm × 6.0 mm)
- Emission spectra similar to sunlight

Test room
- Four independent gases supply lines
- Compressed air
- 1-phase and 3-phase AC current electricity supply
- Close-loop cooling water circuit

Target movable table
- Maximum load: 250 kg
- XYZ positioning system with a position accuracy of 1 mm

High temperature/high flux characterization
- Thermal imaging systems
- CCD and CMOS cameras
- Pyrometer
- Calorimeters

Process gas analysis
- H_2, O_2, CO, CO_2, CH_4 gas analyzers for continuous gas composition monitoring
- Micro-gas chromatograph

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KIRAN-42

High-Flux Solar Simulator

42 kWe High-Flux Solar Simulator KIRAN-42

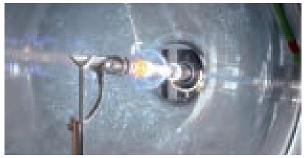
KIRAN-42 is a unique R&D experimental facility in Spain, aimed at conducting high flux/high temperature solar thermal, photovoltaic and thermochemical research. It is capable of supplying high-power density beams, with similar characteristics to those commonly used in concentrated solar energy environments, in well-controlled and stable operating conditions.

The overall facility includes two independent enclosures, which accommodate the test beds and the high-flux solar simulator respectively, and a control setup for the management and operation of the experiment. Both rooms are connected by a large-aperture window furnished with a double-blind shutter system for automatic control of flux. The experimental test beds (e.g. materials, absorbers, receiver, reactors etc.) are installed in the test room on a fully automated positioning table that places them at a chosen spatial position. The test room is equipped with gas, compressed air and electricity supplies, two-points for air extraction system and a data network. The experiment can be monitored directly using the UV-protective window in the test room.

An extensive set of characterization tools makes it possible to measure in situ temperatures and radiation flux density by contact and non-contact techniques and process gas composition if required. A special data acquisition system developed in LabVIEW® allows control and monitoring of the experiment and acquisition of any information required for subsequent analysis.

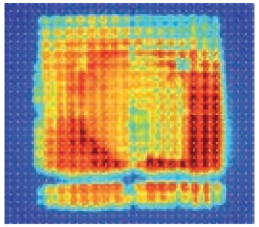
Main applications

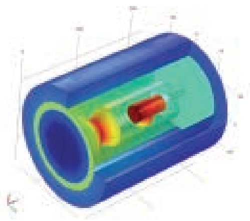
- **Solar concentration optics**
- **Solar receivers and reactors**
- **Advanced thermal fluids for high temperature applications**
- **High-temperature energy storage (thermochemical, latent and sensible heat)**
- **High flux/high temperature characterization techniques:**
  - Irradiance (CCD and CMOS cameras, gardon-type radiometers)
  - Contact and non-contact temperature measurement (thermocouples, pyrometry, thermal imaging systems)



Services

- Thermo-mechanical tests under high-flux and/or in high temperature environments
- Solar thermal or thermochemical tests at high temperature
- Materials durability assessment under high temperature
- Thermal treatment of materials (surface finishing, high-temperature melting)
- Synthesis of nanomaterials or high-temperature materials





Advantages

- High controllability and stable irradiance (absence of perturbations due to solar resource intermittency)
- Flexible aiming point strategy and irradiance distribution
- Completely automated
- Versatile and reconfigurable system