

Making Light Work Better  
Designer and Manufacturer of Scientific Instruments Since 1985

[www.sciencetech-inc.com](http://www.sciencetech-inc.com)

Celebrating



1985 - 2020



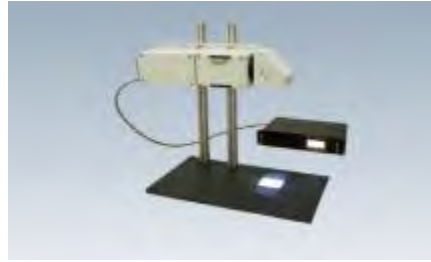
Sciencetech strives to maintain our long term commitment to research and development over a broad spectrum of industries and applications by designing and manufacturing solar simulators and optical spectroscopy instruments.



# Main Lines of Equipment



**Research Grade  
Light Sources**



**Solar Simulators**



**Large Area Solar  
Simulator**



**QE/IPCE  
Measurement  
System**



**Tunable Light  
Sources**



**Monochromators**



**THz Spectroscopy**



**Custom  
Solutions**



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# Research Grade Light Sources



# Research Grade Light Sources

## Xenon Arc Lamp



- Operational wattages : 75W – 1.6kW
- Collimated or focused beam output
- Broadband light emission from deep UV to IR

## Deuterium Lamps



- Operational wattages : 30W – 500W
- Collimated or focused beam output
- Ideal for high intensity deep UV emission

## QTH Lamps



- Wattages from 50W– 2000W
- Highly stable light output
- Ideal for applications in VIS and IR emission



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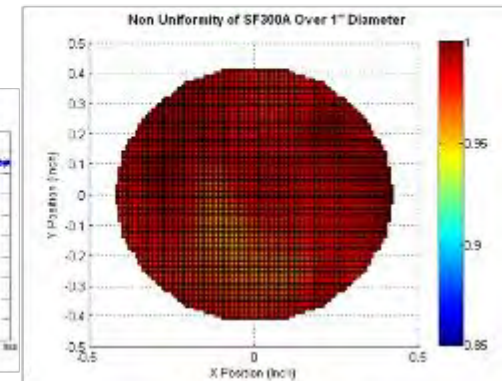
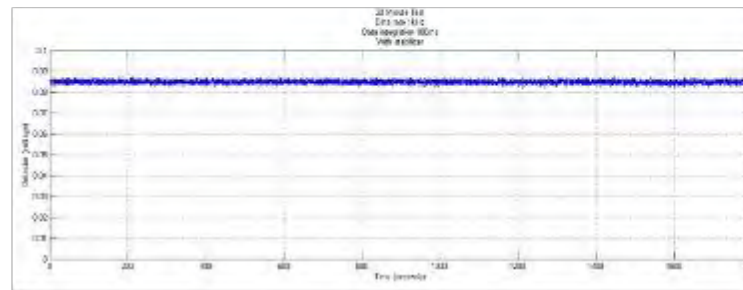
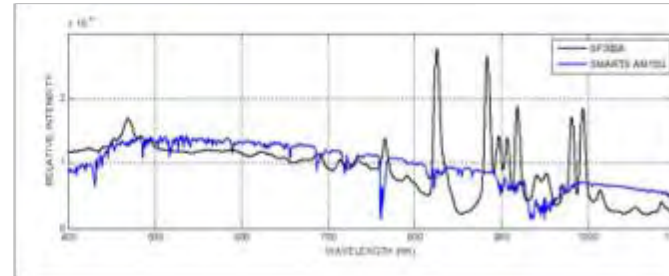
# Solar Simulators



# Solar Simulator Guidelines and principles

## Characteristics ‘simulated’ from a Solar Simulator

- 1) Spectral match
- 2) Spatial uniformity
- 3) Temporal stability
- 4) Power/Irradiance at the target of illumination
- 5) Collimation angle of the output beam



Watch our webinar for an overview of the guidelines and principles behind Solar Simulators.

Link: <https://youtu.be/YOf2N9gMum0>



# Main Standards for Solar Simulation

**Sciencetech Solar Simulators reproduce the sun irradiance according to:**

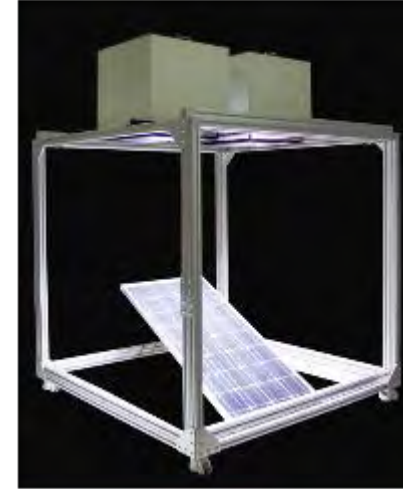
- ASTM E927 - Specification for Solar Simulation for Photovoltaic Testing
- IEC 60904-9 - Solar Simulator performance requirements
- JIS C 8912 - Solar simulators for crystalline solar cells and modules
- JIS C 8933 - Solar Simulators For Amorphous Solar Cells
- JIS C8942 Solar Simulator for Multi-junction solar cells and modults
- IEC 61215 - Crystalline silicon terrestrial photovoltaic (PV) modules - Design qualification and type approval
- IEC 61646 - Thin-film terrestrial photovoltaic (PV) modules - Design qualification and type approval
- US Military Standard MIL-STD810 H\_Method 505.7 For Solar Radiation (Sunshine)
- DIN 75220 - Ageing of Automotive Components in Solar Simulation Units
- COLIPA/ ISO24443 and ISO24443 for dermatological, cosmetic and sunscreen testing





## Why use a solar simulator?

- Provides effective, repeatable and controllable outdoor conditions inside laboratories to test,
  - Performance of power plants
  - Develop new photovoltaic technologies
  - Research work conducted with solar energy
  - Material testing for weathering
  - Simulate extraterrestrial conditions



Sunscreen testing with a UV solar simulator



Watch our webinar on Applications of Solar Simulators Webinar

Link: <https://youtu.be/V-MTEfkFP9I>

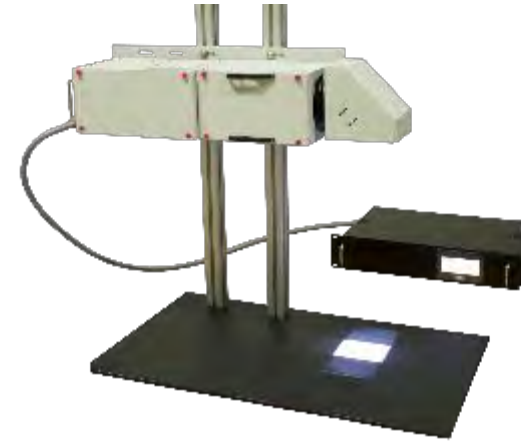


## SF-Series



- Up to class AAA
- Target size upto 50 mm diameter
- One sun irradiance

## SciSun



- Class AAA
- Target size 50 mm × 50 mm
- Up to two sun irradiance

Available Air Mass filters include AM0, AM1.0, AM1.5G (more options available upon request)



## Fully Reflective Solar Simulator



- Class AAA Solar Simulation
- Provides a well collimated light output
- Ideal for applications requiring higher UV output
- No refractive optics and free of chromatic aberration

## SL Series



- Class AAA Solar Simulation
- Target size up to 60 mm × 60 mm
- Provides up to two sun irradiance
- Comes with a workstation ideal for PV cell testing.



## Ultra High Efficiency (UHE)



- Class AAA Solar Simulation
- High electrical to optical power conversion efficiency
- Environmentally friendly operation.
- Target size up to 30 cm × 30 cm

Watch our product demonstration video for ultra high efficiency solar simulator (UHE-NL-150) with I-V testing equipment

Link: <https://youtu.be/A0oS70Dn5sQ>

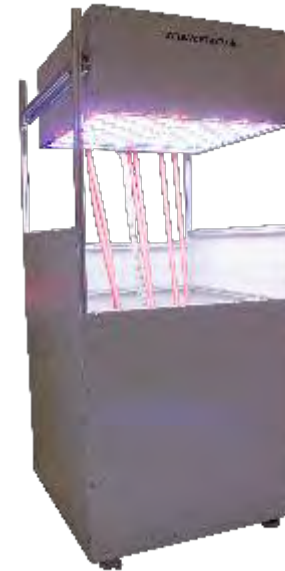


## Large Area Solar Simulators



- Variable illumination areas upto 5mx5m
- Class AAA solar simulation
- AM0, AM1.5G or other specialty spectral matches
- Various degrees of collimation, depending on customer requirements

## LED Solar Simulator



- Customizable large LED solar simulators available upon request
- Spectrally adjustable, ideal for multi junction PV testing
- Stepwise/ continuous irradiance attenuations



## Highly Collimated Solar Simulators



Solar Simulator. Highly Collimated Solar Simulators  
Link: [https://youtu.be/BsR\\_j12i4sw](https://youtu.be/BsR_j12i4sw)



- Highly collimated,  $0.7^\circ$  collimation half angle
- AM0, AM1.5G or other specialty spectral matches
- Up to class ABA
- Target size up to 30 cm diameter
- Fresnel lenses are used as optics to provide highly collimated light output



# Fiber Optic Output Solar Simulators



- Fiber optic output for flexible illumination
- Up to class AAA solar simulation
- Upto 50mm × 50mm
- Upto 9 suns irradiance on target plane
- Collimated or focused beam outputs available
- AM1.0D, AM1.5G, AM1.5D, AM2.0 and other specialty spectral filters available
- Integrate with glove boxes, vacuum chambers & other specialty sample chambers



# Flash Solar Simulators

## Large Area Flash Solar Simulators



- Class AAA
- Target Size: up to 2 m × 2 m
- Uses a heavy duty xenon flash lamp
- Pulse duration: 0.5 – 2.5 ms

## Concentrated Flash Solar Simulators

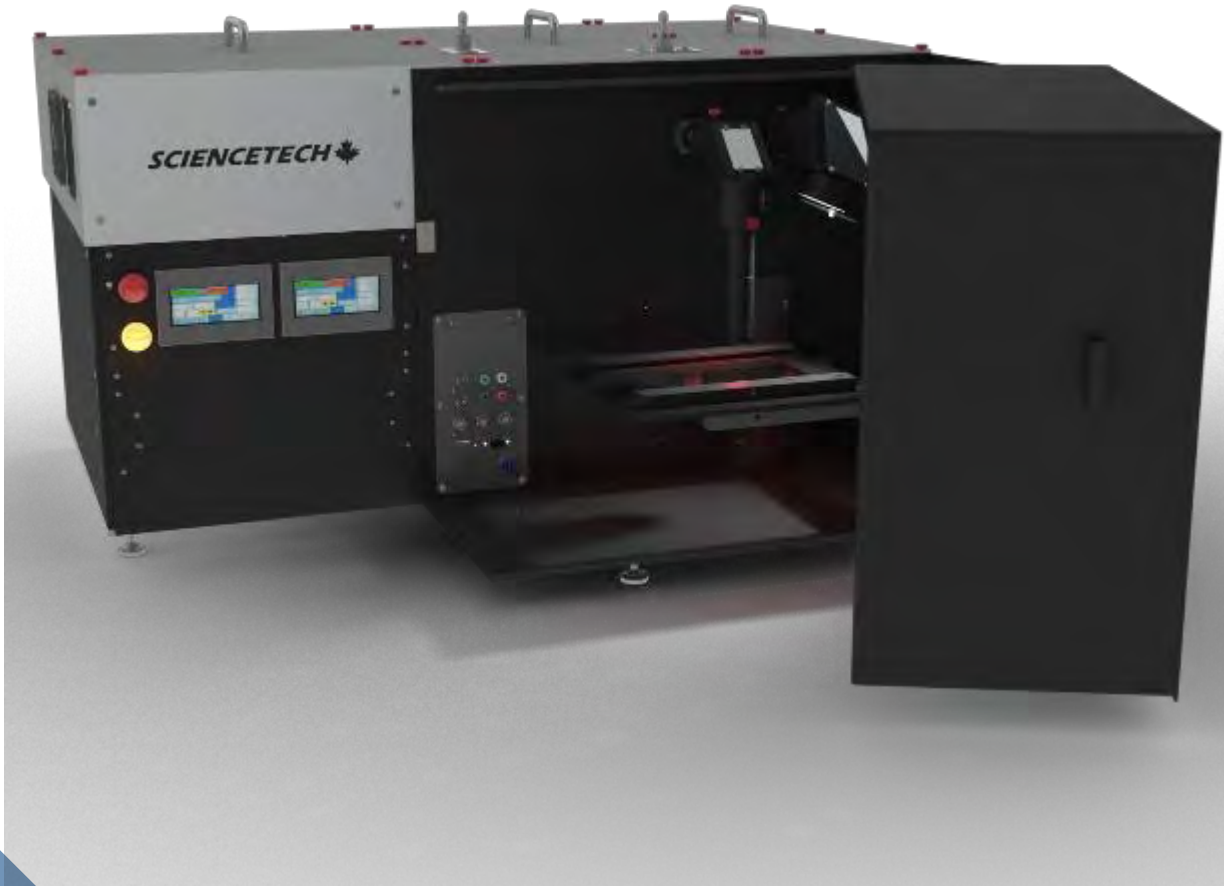


- Class AAA
- Target size: 5 cm × 5 cm
- Ultra high intensity, up to 4000 suns





# Quantum Efficiency Measurement



- Spectral Response : 250 - 2500 nm
- IV Measurements
- Internal and External Quantum Efficiency
- Reflectance and transmittance measurements
- Induced Voltage (IV) :  $V_{OC}$  ,  $I_{SC}$  ,  $R_{shunt}$  ,  $P_{max}$  , efficiency % , and fill factor
- Monochromatic light power up to 125 mW
- Bias light : class AAA solar simulator included
- Keithley 2400 series source meter
- Stanford SR800 series lock-in amplifier
- Designed for compliance with ASTM E1021 , ASTM E948 , IEC 60904-8 , IEC 60904-I



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# Optical Spectroscopy Systems



# Tunable Light Sources

## Introduction to Sciencetech TLS



Product Demonstration video

Link: [https://youtu.be/JawQmMEc\\_m4](https://youtu.be/JawQmMEc_m4)



- Produces monochromatic light from 300 nm to 1800 nm.
- Optical resolution from 20 nm to 0.2 nm.
- Collimated light output is standard.
- Condensed or coupled output light can be provided.
- Sciencetech's software, Sci-Spec, controls all components of the system



- Double additive/subtractive and triple monochromators are available!



	9030	9072	9010	9055	9057	9040	9490	9150
Focal Length (mm)	100	125	200	250	457	550	1000	1500
F/#	3.2	3.5	3.5	3.5	8	6.9	13	12
Grating Size*	S (32 × 32)	T (30 × 30)	D (50 × 50)	T (50 × 50)	T (50 × 50)	T (64 × 64)	T (64 × 64)	S (110 × 110)
Resolution (nm) **	1	0.4	0.4	0.2	0.2	0.03	0.017	0.013

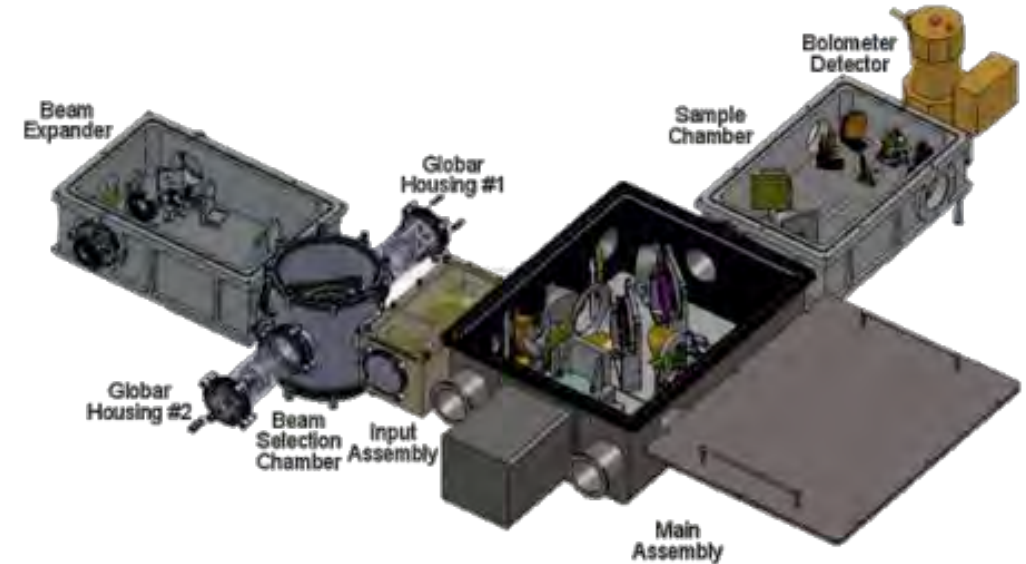
\*S for single, D for double, T for triple, grating size mm × mm

\*\* Available for gratings with 1200l/mm



# Far Infrared Fourier-Transform Spectrometer

## SPS-300

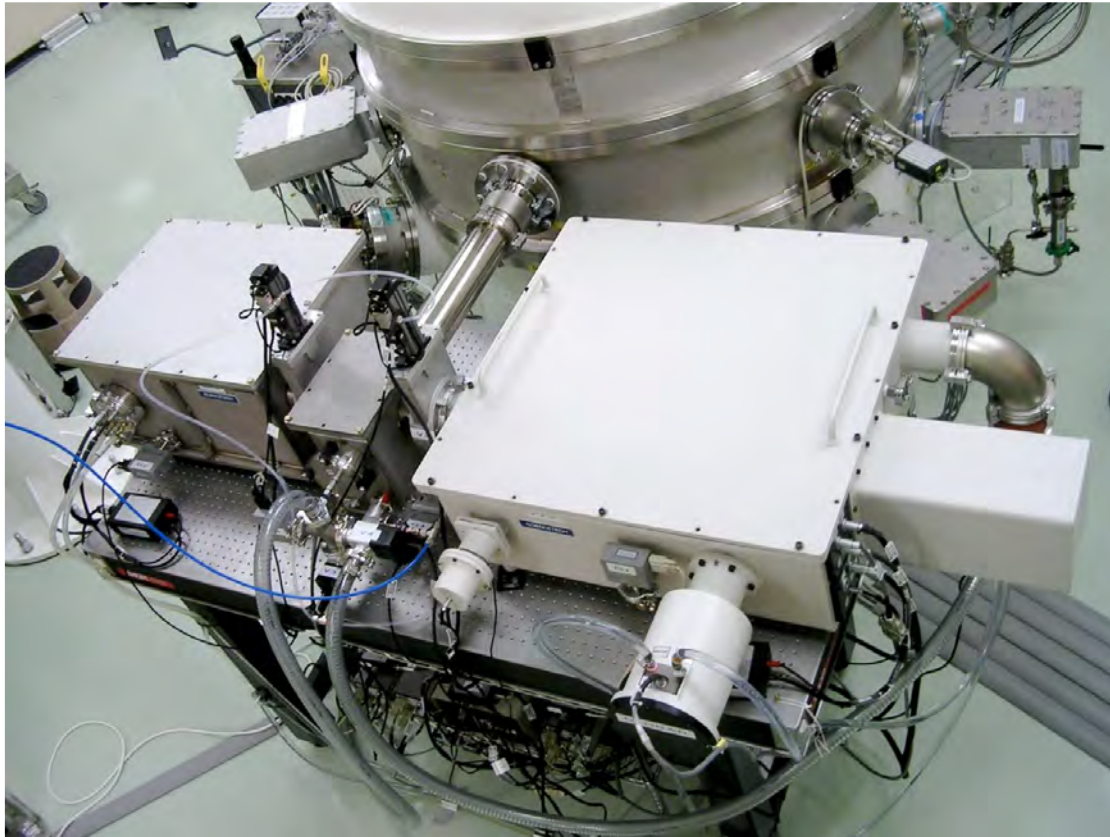


- Modified Michelson (Martin-Puplett) interferometer, vacuum compatible, helium-cooled bolometer
- Operates in the far infrared or THz spectral region (from 5  $\mu\text{m}$  to 5000  $\mu\text{m}$ , 0.06 to 60 THz or 2  $\text{cm}^{-1}$  to 2000  $\text{cm}^{-1}$  )



# Far Infrared Fourier-Transform Spectrometer

ESA used Sciencetech's SPS-200\* to calibrate the detectors for its Planck satellite, allowing the telescopes to analyze the infrared radiation remaining from the Big Bang



\*SPS-200 is a precursor to the Sciencetech's current SPS-300



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# Custom Solutions



Sciencetech offers custom solutions for your research or industrial needs



**Photovoltaic**  
Testing solar cell  
performance



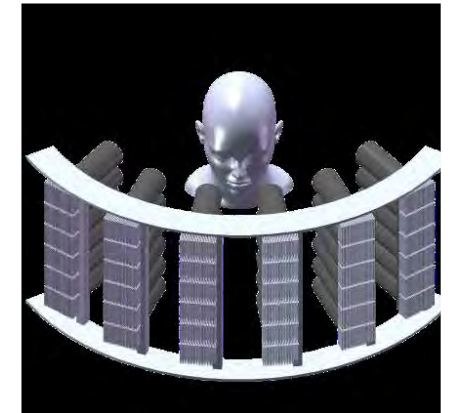
Space Environment  
Simulation



Material Testing for  
automotive industry



Solar Thermal  
power plant testing



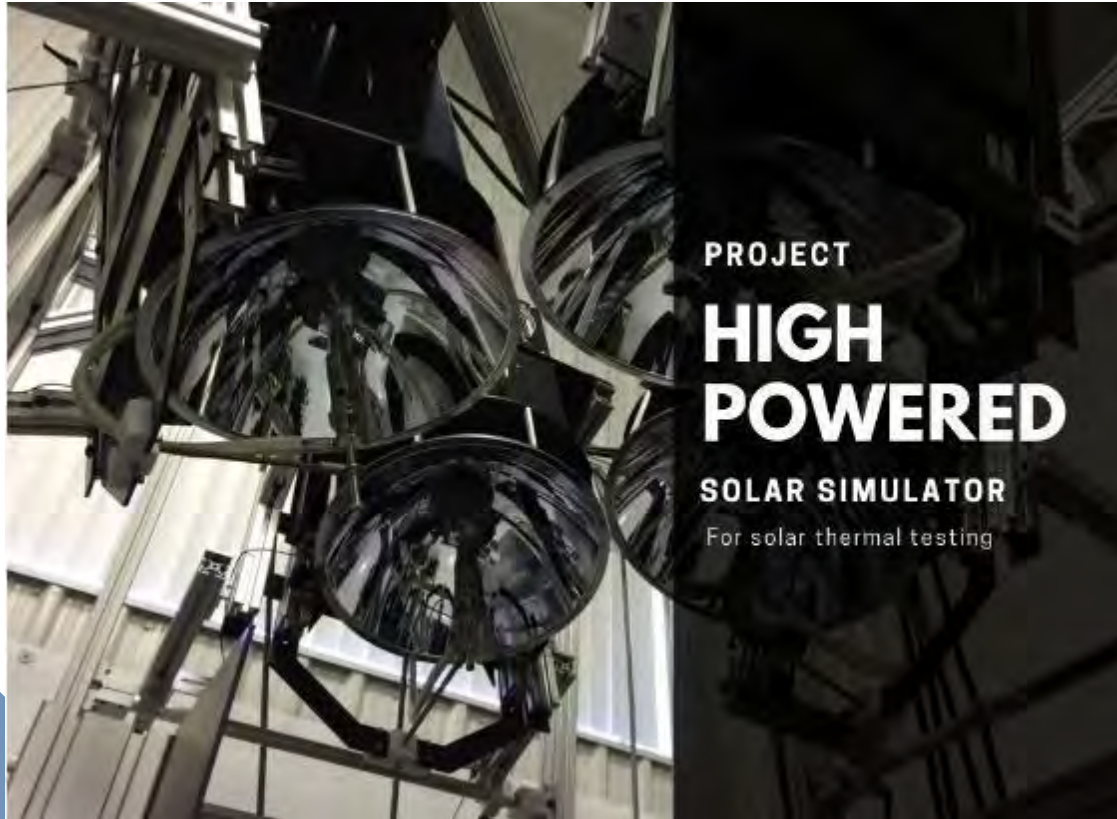
Dermatology and  
sunscreen testing

**Custom solar simulators, speciality light sources and spectroscopy systems**





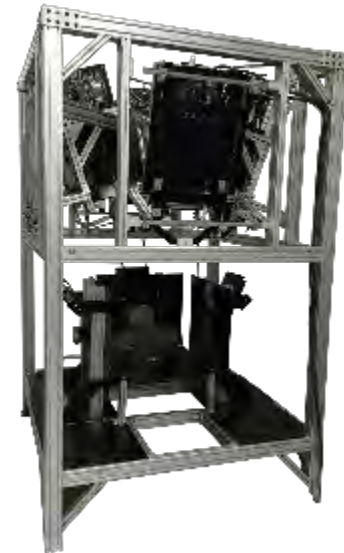
# Spot-Focused Image Furnace for Ultra-High Temperature Oxidation Studies



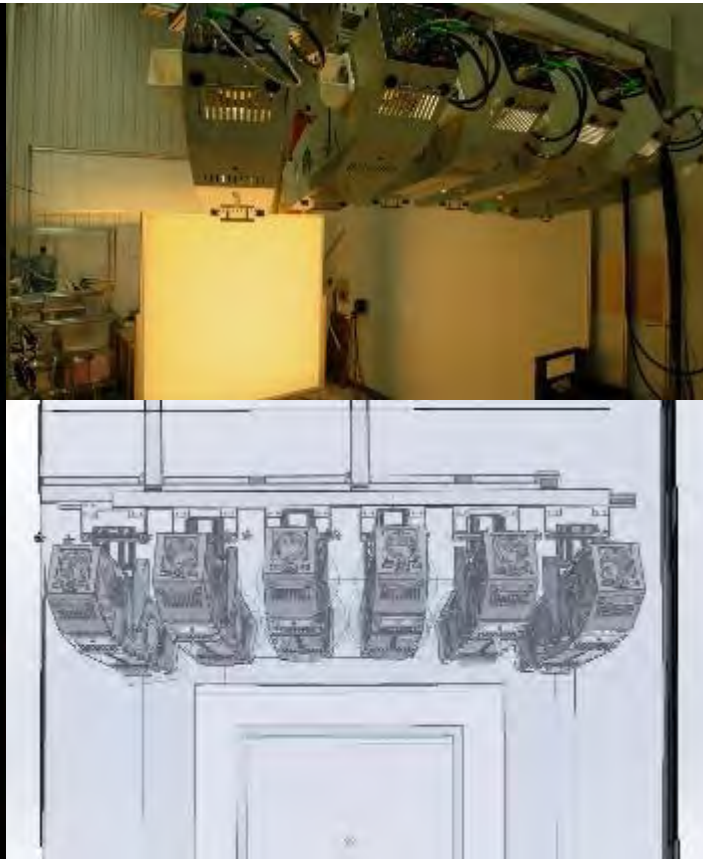
Screw melts in 30 seconds with only 20% power



- Four 6.5 kW Xenon Arc Lamps
- Target size 5 cm diameter
- More than 10 kW optical power at target plane
- More than 5,000 suns



# High Depth of Field IR Solar Simulator



PROJECT

## LARGE AREA IR

SOLAR SIMULATOR

With high spatial uniformity.

- Target Area 1m × 1m : ± 5% Non-uniformity.
- Target Area 1.5m × 1.5m : ± 30% Non-uniformity.
- Spectral match : ASTM Class A in 700 nm – 1000 nm.
- Power and uniformity maintained over 30 cm depth.
- Application: 3D camera testing.



# Highly-Collimated Solar Simulator for Space-Related Research

## PROJECT

# HIGHLY COLLIMATED SOLAR SIMULATOR

With automated beam angle movement.  
Developed for a prominent national  
space agency.



- Class AAA
- Highly collimated output :  $0.35^\circ$  half angle collimation
- AM0 spectral match
- 5-axis automated movement
- Continuous attenuation from 0.01-1 sun
- ISO7 cleanroom compliance



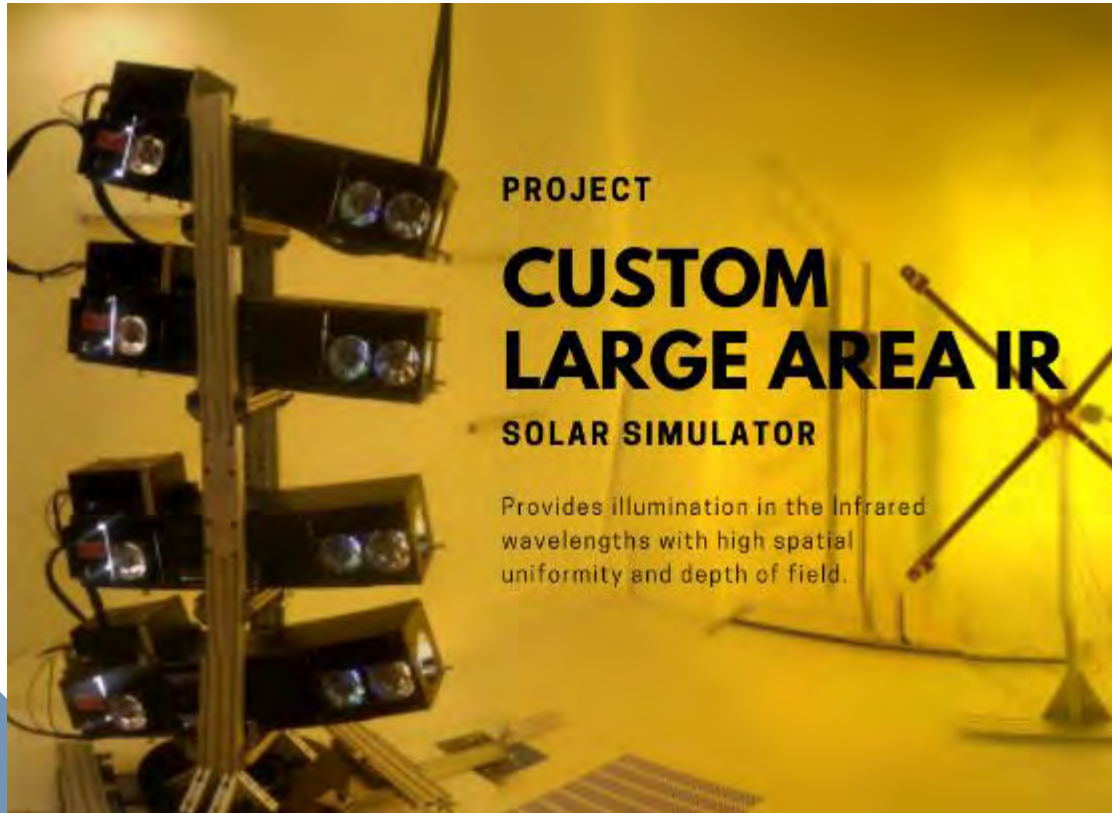
# UV Solar Simulator for Air-pollution Studies in the Upper Atmosphere



- Illuminates a rotating cylindrical drum designed to hold aerosols in suspension.
- 0.5 m<sup>2</sup> target area
- Collimation of 1° half angle.
- AMO spectral match
- Variable attenuation from 0.25- 1 sun.
- The system was designed to fit within a room of dimensions 3m x 5m x 2.5m
- Constant temperature regulation of the system to maintain at 25 ° C



# Large Area QTH Solar Simulator



- Solar Simulator consisted of Eight 2kW QTH sources
- Target area : 1.5m x 1.5m
- Wavelength range : 700-1100 nm (AM1.5G, 1 sun irradiance)
- Temporal Instability :  $\pm 5\%$ .
- Irradiance attenuation adjustable between 0.1-1 sun





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Thank you and do contact us for your future optical spectroscopy and solar simulator needs!

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