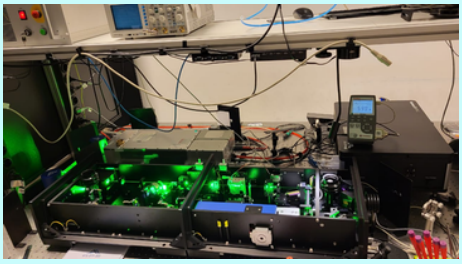
LASER SCIENCE
Bringing Tomorrow's Technology Today

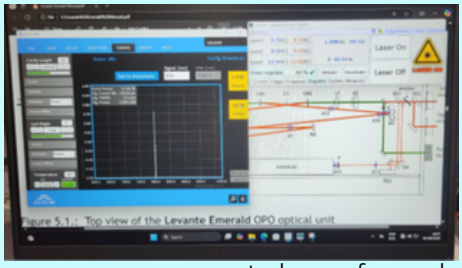
Tomorrow Today

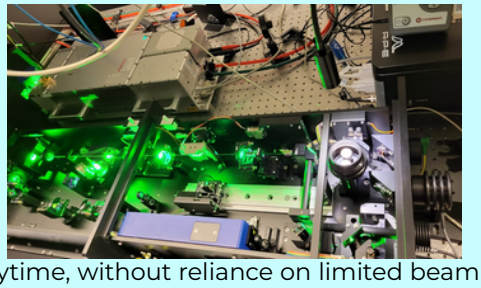
NEWSLETTER EDITION - 07

COHERENT LASER INDIA

First of its kind in India Table Top Laser Based ARPES Installed at TIFR Mumbai







We are proud to announce the successful installation of India's first table top laser based Angle Resolved Photoemission Spectroscopy (ARPES) laser source at the Tata Institute of Fundamental Research (TIFR), Mumbai a major milestone for advanced research infrastructure in India.

Supplied by APE, Berlin, this state-of-the-art laser system significantly enhances ARPES capabilities and opens new opportunities in materials science and condensed matter research.

The complete system, including the Levante and Harmonixx units, was installed and commissioned in record time by Laser Science Services engineers Mr. Rajneesh Vishwakarma and Mr. Balaji Janakiraman, demonstrating exceptional technical expertise and seamless execution in a single, integrated installation at the TIFR laboratory.

This successful installation reflects the company's continuous investment in advanced employee training, enabling the team to efficiently and independently execute complex product installations and commissioning.

This deployment reinforces our commitment to delivering world-class laser solutions and supporting premier institutions like TIFR with next generation scientific tools.

What is Laser-Based ARPES?

Laser based ARPES uses a narrow-band UV laser as the excitation source, offering key advantages over synchrotron radiation. The compact, table-top setup allows experiments to be performed anytime, without reliance on limited beam time.

With an energy resolution of ≤ 0.5 meV, laser-based ARPES provides significantly higher resolution than synchrotron sources (typically 5–20 meV). The tunable photon energy range of 5.77–6.5 eV enhances bulk sensitivity and momentum resolution, making it especially suitable for studying electronic states near the Fermi level.

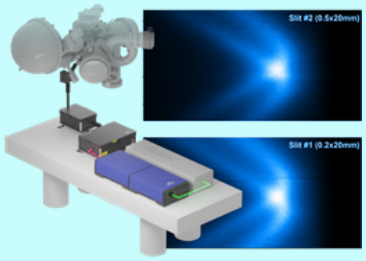
System Details :-

Laser Source : Levante Emerald with HarmoniXX FHG 3+1 ps.

Levante Emerald :

Details Specifications :-

- Signal wavelength range : 700....990 nm
- Idler wavelength range : 1150....2200 nm
- Signal power (@800nm) : > 1.75 mw
- Idler power (@1250nm) : >1.0 mw
- Signal bandwidth : 0.2 nm



HarmoniXX FHG 3+1 ps :

- SHG : > 3% of conversion of Signal
- THG : >0.8%
- FHT 3+1 : >0.015%
- FHG 2+2 : > 0.008%

Global Transition, Continued Commitment: Bystronic Rofin in India

In a significant development in the global laser industry, Bystronic Group successfully completed the acquisition of Coherent Corp.'s Tools for Materials Processing business unit in January 2026. As part of this, Bystronic also reacquired the Rofin brand a globally respected name in industrial laser technology and established Bystronic Rofin as a dedicated business unit, headquartered in Gilching, Munich.

Building on this global milestone, Coherent Laser India (CLI) is proud to continue the representation of the Bystronic Rofin product line in India. Since 2017, CLI has been an authorised distributor for Coherent Corp., representing its industry-leading laser sources and materials processing technologies, including solutions for micro material processing, laser marking and engraving, precision welding, drilling, and cutting across metals, glass, ceramics, and polymers with best-in-class sales & service support.

Following this global transition, CLI will continue representing these product lines in India through a strategic partnership with Bystronic Rofin. The company remains committed to supporting its existing customers while further expanding the market presence of these advanced laser technologies across India.

With this development, Coherent Laser India further strengthens its long-standing commitment to delivering world-class laser sources and complete laser systems to customers across India.

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Laser Science Sparks New Conversations at iCDEM 2026

Chennai's IIT Madras campus hosted one of the most forward-looking materials science gatherings of the year the International Conference on Diamond and Emerging Materials, iCDEM 2026. And if there was one theme that ran through every session, every conversation, every exchange at the conference, it was this: diamond has outgrown the jewellery box. It now sits at the intersection of quantum photonics, wide-bandgap semiconductors, and next-generation sensing and the research community is just beginning to explore its full potential.

Laser Science Services was proud to be part of this conversation as a Gold Sponsor, not just as an exhibitor, but as a technology partner with a direct stake in where advanced materials research is headed.

Our honorable MD-Dr. Lalit Kumar and Sales VP-Jagadesh Obulapuram joined conference dignitaries Prof. M S Ramachandra Rao, Prof. Sathyan Subbiah, and Prof. N. Arunachalam for rich discussions spanning emerging research trends, expanding diamond applications, and the evolving landscape of advanced materials. The dialogue spanned academia, industry, and everything in between from quantum photonics researchers to professionals from the jewellery sector discovering new dimensions of the material they work with every day.

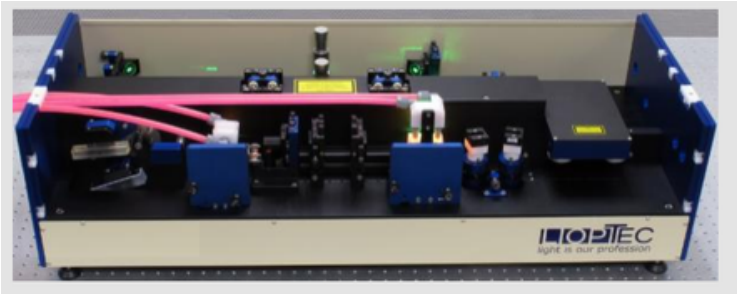
As diamond and transparent materials move deeper into scientific and industrial applications, laser-based processing has gone from a specialist technique to an essential capability. Three technologies are at the centre of this shift: Excimer Lasers, Femtosecond Lasers, Nd:YAG Lasers.

From precision micro-structuring of diamond surfaces to high-resolution spectroscopy of wide-bandgap semiconductors these are the tools that make the next chapter of materials science possible.

Laser Systems: Air Pollution Monitoring Application

The LiopStar pulsed dye laser, with its extremely narrow linewidth, broad tunable spectral range (197–5000 nm), and high beam quality, is well suited for advanced atmospheric and air-pollution monitoring techniques

Its tunability allows selective excitation of specific molecules and pollutants in the atmosphere. In air-pollution studies, the laser can be used in:



LiopStar Pulsed Dye Laser in Air Pollution Monitoring

Raman Spectroscopy / CARS :

The high pulse energy and good beam quality support Raman and coherent anti-Stokes Raman spectroscopy, allowing measurement of molecular signatures of gases such as N_2, O_2, CO_2, CH_4, and other pollution-related species even at low concentrations.

Differential Absorption LIDAR (DIAL) :

The narrow linewidth and wide tuning range allow targeting absorption lines of pollutants such as ozone (O_3), nitrogen dioxide (NO_2), sulfur dioxide (SO_2) etc.

Laser-Induced Fluorescence (LIF) :

The Dye laser's precise wavelength selection enables excitation of specific atmospheric species (e.g. OH radicals, aromatic hydrocarbons). The resulting fluorescence signal provides high-sensitivity, real-time detection of trace pollutants important in smog chemistry.

Raman Spectroscopy / CARS :

The high pulse energy and good beam quality support Raman and coherent anti-Stokes Raman spectroscopy, allowing measurement of molecular signatures of gases such as N_2, O_2, CO_2, CH_4, and other pollution-related species even at low concentrations.

- Zakaria Shaikh
Sales Executive, LSS

Expanding Horizons Welcoming New Principals

Laser Science has strengthened its technology portfolio with powerful new principals each bringing unique expertise that broadens the depth and diversity of solutions we can offer our customers.

Our newly added principals bring specialized capabilities across multiple areas of photonics and laser technology:

Bright Solutions (Italy)–*Nanosecond and high-energy laser systems for scientific and material processing applications.*

Standa (Lithuania)–*Precision opto-mechanical components, motion control systems, and positioning solutions.*

Integrated Optics (Lithuania)–*Compact, high-performance diode-pumped solid-state lasers for scientific and industrial applications.*

Eksma Optics (Lithuania)–*Laser crystals, nonlinear optical components, and precision optics for photonics research and laser development.*

N2 Photonics (Germany)–*Innovative ultrashort pulse laser technologies and pulse compression solutions enabling high-performance femtosecond laser applications*

EdgeWave (Germany) – *High-performance short- and ultrashort-pulse laser systems based on InnoSlab technology*

Together, these partnerships significantly enhance our ability to serve a wider range of scientific, industrial, and OEM applications giving our customers access to cutting-edge innovations and deeper technical expertise at every stage of their projects.

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COHERENT LASER INDIA

Celebrating Indian Science & Research Personalities

Prof. Rajakumar Balla

Professor, Department of Chemistry, and Chairman, Library Advisory Committee, Indian Institute of Technology Madras, Chennai.

Meet Prof. Rajakumar Balla

Prof. Rajakumar Balla's journey from a remote village in northern Andhra Pradesh to becoming a leading atmospheric chemist at the Indian Institute of Technology Madras (IIT, Madras) is a testament to the power of education and perseverance. Today, he leads advanced research in atmospheric chemistry, utilizing state-of-the-art laser-based instruments such as Cavity Ring Down Spectroscopy (CRDS) and Laser Induced Fluorescence (LIF) to investigate chemical processes that influence climate change, ozone chemistry, and air quality.

Research Highlights

The group's impact can be seen through their recent contributions to peer-reviewed literature:

- Mondal, K.; Balla, R. Investigation of Kinetics of Phenyl Radicals with Ethyl Formate in the Gas Phase Using Cavity Ring-down Spectroscopy and Theoretical Methodologies. Photochem. Photobiol. Sci. 2021, 20 (7), 859–873.
- Mondal, K.; Kumar, A.; Rajakumar, B. Kinetics of IO Radicals with Ethyl Formate and Ethyl Acetate: A Study Using Cavity Ring-down Spectroscopy and Theoretical Methods. Phys Chem Chem Phys 2021, 23 (45), 25974–25993.

Kumar, A.; Mondal, K.; Rajakumar, B. A Combined Experimental and Theoretical Study to Determine the Kinetics of 2-Ethoxy Ethanol with OH Radical in the Gas Phase. J Phys. Chem A 2021, 125 (40), 8869–**8881.**

A Career Dedicated to Atmospheric Science

After completing a postdoctoral research tenure at the National Oceanic and Atmospheric Administration (NOAA) in Boulder, Colorado, USA, Prof. Rajakumar joined the Department of Chemistry at the Indian Institute of Technology Madras, Chennai. Since joining the Institute, he has focused his research on the vital field of Atmospheric Chemistry.

To support this work, Prof. Rajakumar has established a state-of-the-art research laboratory equipped with supersensitive instrumentation, including:

- Cavity Ring Down Spectrometer (CRDS)
- Laser Induced Fluorescence (LIF) Spectrometer

Impact and Contributions

His research group utilizes these advanced tools to study critical reactions occurring within the Earth's atmosphere. By investigating atmospherically important compounds, Prof. Rajakumar provides the global community, both scientific and non-scientific with essential data regarding:

- Global Warming Potentials (GWP)
- Ozone Creating and Depletion Potentials

Dr. Lalit Kumar Shares Visionary Insights at ChemDay-2025, IIT Roorkee

An inspiring moment unfolded at ChemDay-2025, IIT Roorkee, when the Managing Director, Dr. Lalit Kumar, delivered a distinguished talk at the very institute from which he once graduated. Returning as a leader in the field, he engaged deeply with young researchers, encouraging curiosity, innovation, and scientific ambition.

His session, titled "Use of Lasers in Emerging Scientific Research Applications," captivated the audience with compelling insights into how photonics is revolutionizing experimental methodologies, enabling precision technologies, and driving the next wave of scientific breakthroughs.

Dr. Kumar's address emphasized the growing significance of laser-based techniques across diverse domains including chemistry, materials science, biomedical research, and advanced instrumentation. His talk illustrated how these technologies are shaping the future of scientific discovery and application.

Events such as ChemDay-2025 highlight the vital role of collaboration between academia and industry. Such interactions not only foster creative thinking and research excellence but also accelerate meaningful scientific progress across the nation.

CEO Sonal Agrawal Delivers Insightful Talk at UFS Conference 2025

An inspiring start to the UFS Conference 2025, hosted by IIT Hyderabad, brought together some of the brightest minds and leading researchers in ultrafast science. A key moment for Laser Science was the insightful talk delivered by CEO, Ms. Sonal Agrawal, who shared her perspectives on emerging trends, technological challenges, and the future of ultrafast laser applications in India. Her session sparked meaningful discussions and resonated strongly with the photonics community, highlighting the importance of innovation and collaboration in advancing ultrafast research.

The Laser Science booth also attracted significant interest for showcasing their latest ultrafast laser solutions, enabling engaging conversations with delegates and opening pathways for new collaborations.

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Solutions That Solve Real Problems

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Axon FP: Next Generation Fiber-Delivered Ultrafast Sources

Meet the Axon FP a next-generation fiber-delivered ultrafast laser source designed for life sciences, imaging, inspection, and nano-processing. It integrates the controller, power supply, and optical head into a single rack-mountable unit, simplifying optical setup and reducing system complexity. With 1W average power, high-quality femtosecond pulses, and adjustable dispersion pre-compensation, it ensures consistent performance at the point of use Its portable, plug-and-play architecture enables repeatable integration and easy sharing across experimental setups.

Litron Lasers

TRLi Series

Meet the TRLi Series from Litron Lasers is a compact, high-energy Q-switched Nd laser platform designed for demanding scientific and industrial applications.

Delivering up to 850 mJ pulse energy at 1064 nm and repetition rates up to 300 Hz, the TRLi Series features a twin-rod design for superior beam quality, automated harmonic generation down to 213 nm, and intelligent auto-tuning for reliable performance. Ideal for spectroscopy, LIBS, LIDAR, laser pumping, ablation, and advanced research applications

excelitas

pco.dimax 3.6 ST High-speed Camera

Meet the pco.dimax 3.6 ST CLHS is a high-speed streaming camera developed for continuous acquisition at full 3.6 MPixel resolution and over 2000 frames per second. Its Camera Link HS (CLHS FOL) interface enables real-time, uncompressed 10-bit data transfer over 8x10 Gb optical fiber.

The streaming architecture removes the limitations of internal memory, allowing virtually unlimited recording times and immediate access to captured image data.

THORLABS

Thorlabs Optical Spectrum Analyzer

Meet the Thorlabs Optical Spectrum Analyzer a high-resolution tool engineered for telecommunications, photonics, and quantum optics.

It delivers precise spectral measurements with exceptional wavelength accuracy and high optical throughput, surpassing the performance limits of conventional grating-based spectrometers.

Successful Installation of 5 Active Vibration Isolation Tables at DIAT, DRDO – Pune

We are proud to share a major milestone with the successful installation of five (5) DVIA-MO-1000 Active Vibration Isolation Optical Tables at the Defence Institute of Advanced Technology (DIAT), DRDO – Pune.

This installation marks India's first deployment of highly complex Active Vibration Isolation Optical Tables, enabling an ultra-stable experimental environment for advanced scientific research.

Applications :

- *Photonics & Laser Systems*
- *Holography*
- *Spectroscopy*
- *Nanoscale-Resolution Microscopy*
- *Ultra-Low Vibration Research Setups*

Our service team successfully completed installation and commissioning, reinforcing our commitment to delivering world-class vibration isolation solutions for India's most advanced research facilities.

DVIA-MO-1000: Precision Beyond Limits

The DVIA-MO series integrates our advanced DVIA-M Active Vibration Isolation System with a high-performance optical tabletop, delivering exceptional vibration control for applications requiring sub-5 Hz isolation.

Performance :

50–80% isolation at 1 Hz
≥90% isolation at ≥2 Hz

Key Highlights :

- **Sub-Hertz Isolation Performance :** Achieves 50–80% vibration isolation at 1 Hz and ≥90% isolation at 2 Hz using advanced active control algorithms.
- **Six Degrees of Freedom Control :** Active isolation in X, Y, Z, Pitch, Roll, and Yaw ensures complete vibration suppression.
- **Advanced Feedback & Feed-Forward Control :** Real-time vibration detection and predictive floor vibration filtering for maximum stability.
- **Super-Rigid Optical Tabletop :** Designed for long-term rigidity, minimizing relative motion between mounted optical components

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Laser Science Brings Additive Manufacturing to center stage at IMTEX 2026

Laser Science Services team at IMTEX 2026, Bangalore

In January 2026, Laser Science Services (I) Pvt. Ltd. made a significant mark at IMTEX Forming 2026, held at the Bangalore International Exhibition Centre (BIEC) from January 21st to 25th.

The company showcased its Laser Directed Energy Deposition (DED) technology, supported by application-specific case studies, detailed technical specifications, and sample parts demonstrating real-world capabilities across industries.

The booth attracted strong footfall from engineers, industry experts, and manufacturing professionals spanning aerospace, tooling, oil & gas, and heavy engineering sectors.

Laser Science Services (I) Pvt. Ltd.'s participation at IMTEX 2026 reaffirmed their commitment to advancing additive manufacturing in India, as the company continues to drive innovation in laser technology and industrial applications.

A Remarkable Start — Laser Science at Photonics West 2026

Photonics West, organised by SPIE, the international society for optics and photonics, is the world's largest gathering of laser and photonics professionals. Each January, San Francisco becomes the global centre of gravity for the industry, bringing together innovators, researchers, and leaders to shape the year ahead.

Representing Laser Science Services at Photonics West 2026 Managing Director Dr. Lalit Kumar and Chief Executive Officer Ms. Sonal Agrawal attended Photonics West 2026, engaging deeply with principals, partners, and peers from across the global photonics community. From CW lasers and laser engines to the latest advances in ultrafast and integrated photonics, the week offered a rich view of where the industry is heading.

Every conversation held and every partnership strengthened in San Francisco will find its way back to India, translating into better solutions, newer technologies, and stronger support for customers and research institutions. Laser Science Services extends its gratitude to all principals and companions in the global photonics community for making Photonics West 2026 such a success. The year ahead looks full of promise.

Fiber Lasers: Empowering India's Quantum Future

India's National Quantum Mission (NQM) seeks to position the country among global leaders in quantum technologies, targeting quantum computing, secure communications, precision sensing, and advanced materials. Yet a critical enabler remains underdeveloped: indigenous, quantum-grade laser technology.

Lasers are at the heart of every quantum platform. From stabilizing atomic transitions in quantum computers to generating entangled photons for secure communication and probing atomic ensembles for sensing all demand ultra-narrow linewidth, high spectral purity, and exceptional long-term stability. These specifications far exceed what conventional industrial lasers offer.

Currently, Indian researchers and institutions rely almost entirely on imported laser systems costly, slow to procure, and difficult to customize. This dependency is a strategic vulnerability. Without homegrown laser capabilities, building truly self-reliant quantum systems remains an incomplete ambition.

The article makes a strong case for targeted government investment, enabling policies, and deeper collaboration between research institutions and domestic laser manufacturers. The goal is not just lasers that are "Made in India," but lasers

specifically "Designed for Quantum.

Laser Science Services presents itself as a key contributor to this mission. Operating an R&D division at IIT Madras Research Park, the company is advancing fiber laser technologies for defence, medical, industrial, space, and academic applications. Under the leadership of Dr. Shankar Pidishety, the team is now developing quantum-grade fiber lasers meeting the stringent demands of next-generation quantum systems.

quantum technology is only as strong as its core components. Lasers are among the most essential of these building blocks. For India to achieve true quantum self-reliance, empowering indigenous laser development is not a choice — it is a strategic necessity and an urgent national priority.

-Dr. Shankar P
R&D Manager, LSS

Real Learning Happens When Theory Meets - Hands-On Experience

Laser Science took Edu PIV to one of India's most celebrated engineering institutions, Indian Institute of Technology Kanpur (IIT, Kanpur). What followed were two sessions filled with live lab demonstrations, interactive lectures, and the kind of curiosity driven energy that reminds us why science outreach truly matters.

Particle Image Velocimetry (PIV) is a technique that can transform the way students understand fluid dynamics, but its true impact is felt when experienced live. As students watched flow fields being visualised in real time, they moved from passive listeners to active participants, asking questions, engaging with the setup, and experiencing the technology firsthand.

Engagements like these reflect Laser Science's deeper commitment, not just to supplying system, but to nurturing a generation of researchers who know how to use them effectively. When 65 students leave a session understanding PIV in a way no textbook could ever teach, that is a win for us.

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India Makes History: PFBR Kalpakkam Achieves First Criticality

A 70-year vision becomes reality as India joins an elite nuclear club

500	70	200+
MWe capacity	Years in the making	Indian industries involved

In April 2026, a controlled, self-sustaining fission chain reaction began inside the Prototype Fast Breeder Reactor (PFBR) at Kalpakkam and with it, a chapter that generations of Indian scientists had worked toward finally opened.

Designed by the Indira Gandhi Centre for Atomic Research and built by BHAVINI under the Department of Atomic Energy, the PFBR achieved first criticality: the moment neutrons produced by fission equal those lost through absorption and leakage, producing stable power output. It is the essential threshold before a reactor can generate heat, and ultimately, electricity.

A reactor that feeds itself

What makes the PFBR unlike almost any other reactor in the world is its breeding capability. It runs on Uranium-Plutonium Mixed Oxide fuel, with its core surrounded by a blanket of Uranium-238. Fast neutrons bombard this blanket, converting it into fissile Plutonium-239 — effectively producing more fuel than the reactor consumes.

Why this matters for India

India holds one of the world's largest thorium deposits but has limited uranium resources. The PFBR's design ultimately accommodates Thorium-232 in its blanket, which converts to Uranium-233 — the fuel that will power the third and final stage of India's nuclear programme, potentially sustaining the country for centuries.

> **"It's a reactor that keeps feeding itself — and one day, it will feed an entire nation."**
>
> **— On the PFBR's breeding cycle**

Three stages. One long game.

The PFBR is the centrepiece of Stage 2 in India's three-stage nuclear power programme — a strategy conceived by Homi Bhabha in the 1950s to leverage the country's thorium wealth.

Pressurised Heavy Water Reactors	Fast Breeder Reactors	Thorium Reactors
Uses natural uranium, produces plutonium as a by-product. Currently operational across India's 24 reactors.	Burns plutonium from Stage 1, breeds more fuel from U-238, and prepares thorium blankets for Stage	Harnesses India's vast thorium reserves via U-233, creating near-unlimited long-term energy potential

Built in India, for India

The reactor's development involved over 200 Indian industries, including numerous MSMEs — a testament to the country's growing technological self-reliance in one of the most demanding engineering disciplines on earth.

IAEA Director General Rafael Grossi called the development a key step forward in fuel sustainability and the future of nuclear energy, reaffirming the agency's commitment to supporting India's nuclear programme.

What comes next

Full completion of the reactor is expected by September 2026. India's current nuclear capacity stands at 8.78 GW across 24 reactors in seven locations — a figure set to grow dramatically under the Nuclear Energy Mission outlined in the Union Budget 2025–26, which targets 100 GW of nuclear generation by 2047.

Once fully operational, India will become only the second country after Russia to operate a commercial fast breeder reactor. The PFBR isn't just a reactor. It is a bridge — from where India's energy story has been, to where it is boldly headed.

Source *: https://www.businesstoday.in/india/story/bt-explainer-kalpakkam-fast-breeder-reactor-goes-critical-what-it-means-524690-2026-04-08*

CONFERENCE HIGHLIGHTS


UFS-2025


OPTIQ-2025


WOPI-2025


SCOPOSIS-2025


ICPE-2025


ICTACEM-2025


FMFP-2025


ISAMP-2026


ICRTMD-2026


NCWT-2026


SMS3-2026


ICOPP-2026

UPCOMING EVENTS

LASER WORLD OF PHOTONICS
16-17-18 SEPTEMBER 2026
BIEC, BENGALURU

RUDRAS-2026
29TH TO 31ST JULY 2026
RAMOJI FILM CITY, HYDERABAD,

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