

INTERNATIONAL OPPORTUNITIES FOR YOUNG RESEARCHERS



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Aims & Objectives of IC

- Leverage international alliances which can **value add to national programs** and missions
- Gaining **global competitiveness and visibility** through collaboration
- Connect Indian research with global efforts in frontier areas in **addressing global challenges**
- Participation and access to **mega-science projects & advanced facilities**
- Promote eco-system of **innovation and techno-entrepreneurship**
- Enable **Technology development** through applied and industrial R&D
- Connect Indian **innovation model** to gain **access to markets** in developed and developing countries
- Promote **geo-political relationship** through **soft prowess of S&T** as Foreign Policy imperative

Geo-political Considerations in Bilateral Cooperation

- Co-sharing of **objectives** based on **mutuality and parity**
- From a reactive to **proactive engagement**
- Co-investments and **co-generation of values**
- Mitigate **Science and Technology gaps**
- Address **Techno-social** priority **gaps**
- Promotion of **geo-political relationship** as a part of Foreign Policy imperative
- Use **soft prowess** of S&T as a tool for building long term relationship based on **human resource development & capacity building**
- Underpin R&D as part of **knowledge economy**
- Enable **people-to-people** contact as a tool for **public diplomacy** through S&T engagements.

International Partnerships & Alliances

- **Mandate:** Identify, facilitate and promote India's international cooperation in frontier and emerging areas of STI under bilateral, regional and multilateral programs enabled through:
 - (a) Transaction of Business Rules & (b) Cabinet Business Rules

MODELS ADOPTED:

Technology Synergy

Parity based bilateral relationship based on mutuality, co-funding and co-creation

Technology Diplomacy

Investing into promoting S&T base and capacity building for developing & neighbouring countries

Technology Development

Industrial & Applied R&D in fostering innovation and techno-entrepreneurship using PPP model

India's Bilateral S & T Engagements

Asia

- Bangladesh
- Israel
- Japan
- Korea South
- Myanmar
- Singapore
- Sri Lanka
- Thailand
- Taiwan
- Vietnam

North America

- Canada
- Mexico
- USA

South America

- Argentina
- Brazil
- Chile
- Peru

Europe

- Austria
- Belarus
- Belgium
- Bulgaria
- Czech Republic
- Finland
- France
- Germany
- Hungary
- Italy
- Netherlands
- Norway
- Portugal
- Poland
- Romania
- Russia
- Slovenia
- Spain
- Sweden
- Switzerland
- Ukraine
- UK

Africa

- **India Africa Initiative**
- Egypt
- Ethiopia
- Rwanda
- South Africa
- Tunisia

Oceania

- Australia
- New Zealand



Models Adopted

Technology Synergy

Strategic Cooperation with:

- Australia
- France
- Germany
- Israel
- Japan
- Russia
- S. Korea
- UK
- USA

Reciprocal Cooperation with:

- Brazil
- Canada
- Belgium
- CIS & East European
- Finland
- Italy
- Mexico
- Norway
- Netherlands
- Portugal
- South Africa
- Switzerland
- Sweden

Models Adopted

Technology Diplomacy

- **African S&T Initiative**
 - CV Raman Fellowship
 - Twinning Program
 - Training Program
 - Technology Transfer
- **Neighboring Countries**
 - Bangladesh
 - Myanmar
 - Sri Lanka
 - ISRF (Fellowship)
- **Act East Policy**
 - Thailand
 - Taiwan
 - Singapore
 - Vietnam
- **South Americas**

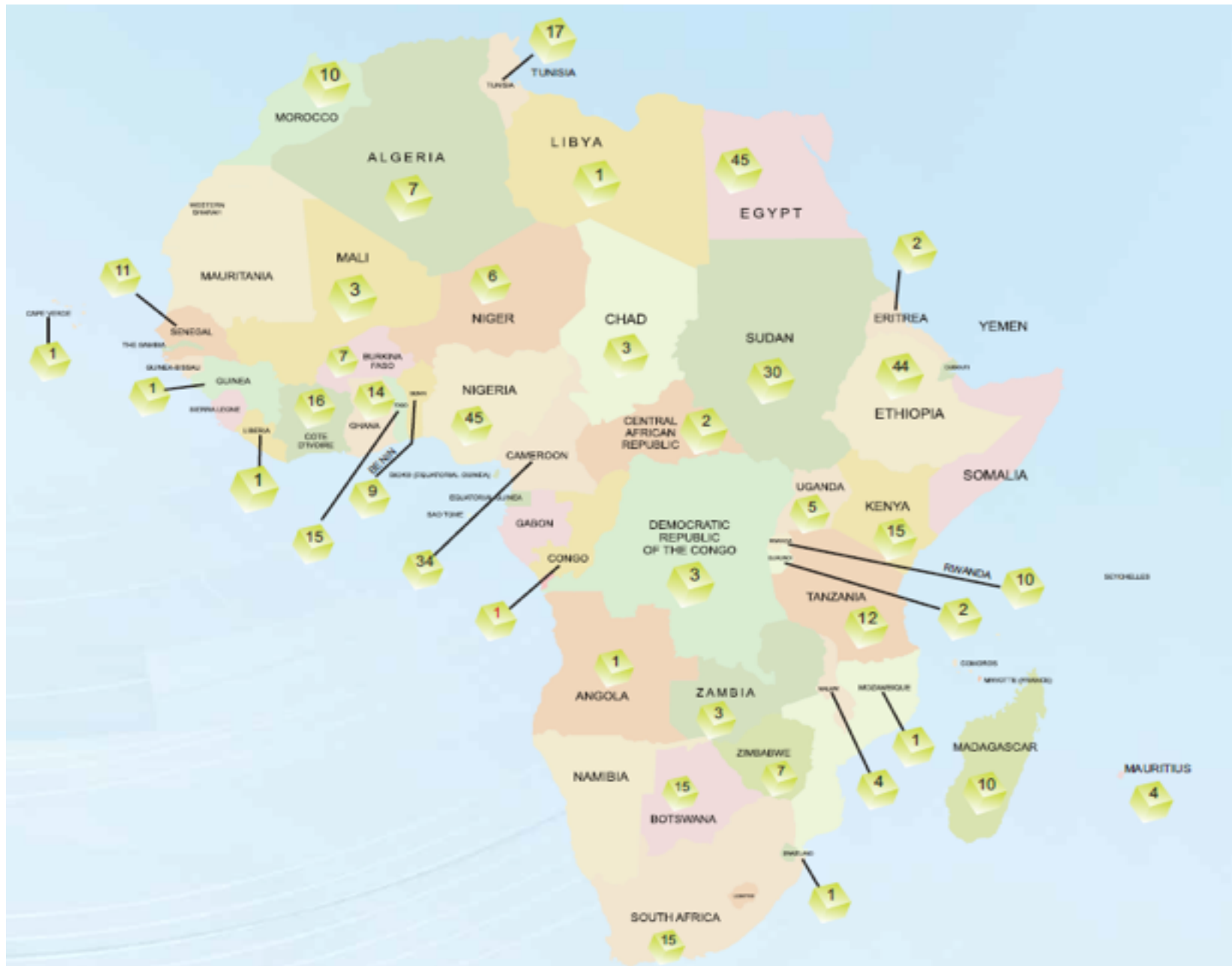
Technology Development

- Canada
- Finland
- France
- Germany
- Italy
- Rwanda
- Spain
- South Korea
- Russia
- United Kingdom

Techno-entrepreneurship & Innovation

- Israel
- South Africa (Grass-root Innv)
- Switzerland
- USA

CV Raman Fellowship Footprint



Tools for International Cooperation

Capacity Building

- Visitation, Fellowships & Student Internships
- Lectures by Eminent Scientists & Nobel Laureates
- Fielding young researchers/ scholars to international meets with Peers
- Access to Advanced Facilities & Participation in Mega-science projects

Provide Support to

- Joint R&D Projects
- Project based mobility exchanges
- Training and Advanced Schools
- Joint Workshops/ Seminars/Frontiers Symposium/Exhibitions

Facilitate and Promote

- Joint R&D Laboratories
- Virtual R&D Networked Centers
- Grand Challenge Multi-institutional R&D projects

Promote Industrial R&D and Techno-Innovation

- Industry-Academia Applied & Industrial R&D Projects
- Innovation and Entrepreneurship
- Facilitate Technology Development & Technology Transfer
- Annual Technology Summit with partner country

Modalities of International Cooperation

Promote pre-commercial R&D and Innovation

- Academia – Industry Projects on Applied R&D
- PPP for Industrial R&D and Entrepreneurship through **GITA platform: Canada, Israel, Italy, Finland, Spain, S. Korea & UK**
- Facilitate Technology Development & Tech Transfer
- Indo-U.S. Endowment Fund for Innovation
- India-Israel Innovation & Industrial R&D Fund (I⁴F)
- Annual Technology Summit with partner country **(Italy-2018)**

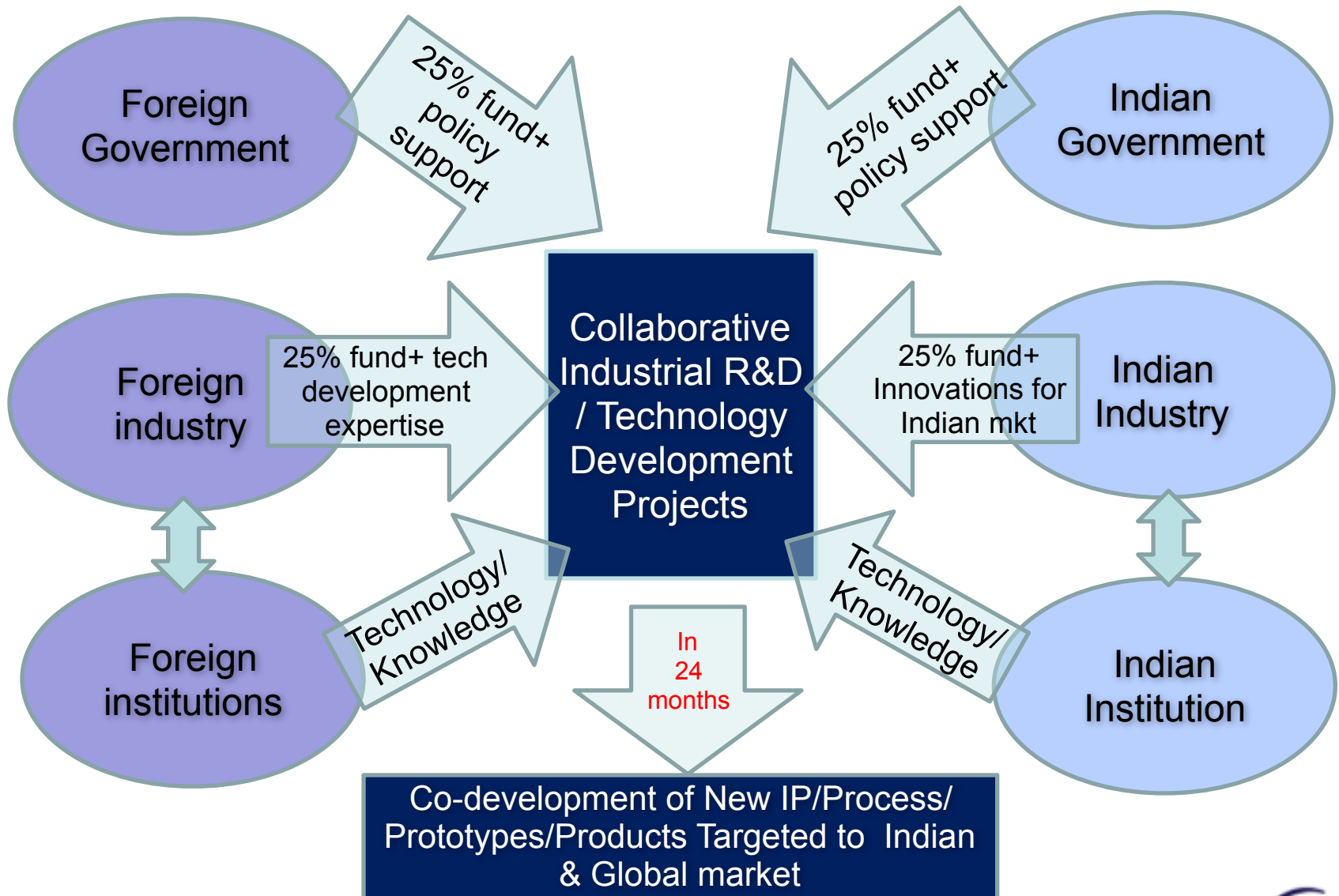
Exclusive Bi-national S&T Bodies

- Indo-French Centre for Promotion of Advanced Research
- Indo-U.S. Science & Technology Forum
- Indo-German Science & Technology Centre **(Industrial & Applied R&D)**

Global Innovation Technology Alliance (GITA)

- A unique institution (**Section 25 Company between TDB & CII**) for providing demand-driven Technology solutions through Institutional & Global alliances via a competitive process.
- A platform for **forging** frontline **Global technological alliances** for Indian companies for achieving R&D leadership in global & domestic markets (**Canada, Israel, Italy Finland, S. Korea, Spain, & UK**).
- **An Innovative PPP mechanism** for attracting Indian industry's investment in technology by **Mapping** technology gaps; **Evaluating** global technology offers from techno-economic perspective; **Connecting** amongst technology developers, providers, commercializes; **Funding** last phase of technology development that connects the market; and **Demonstration** of technology solutions.

Funding Model – Global programs



Technology Readiness Levels (NASA model)

GITA funding support

Technology readiness level (TRL)	1	2	3	4	5	6	7	8	9
Activity	Discovery & Research		Innovation					Commercialisation	
TRL description	Basic principles observed and reported	Concept or application formulated	Experimental proof of concept	Concept or process validated in laboratory	System or component validated in relevant environment	System model or demonstrator in relevant environment	System prototyping demonstrator in an operational environment	Actual system completed and qualified test & demo operational environment	Actual system mission-proven in successful mission operations

Focus Sectors

- Bio-medical & Healthcare Devices
- Renewable Energy Technologies
- Water Purification / Waste Water Treatment
- Information & Communication Technologies (ICT)
- Nano-science & Technology
- Agri-biotechnology
- Food Processing
- Treatment of Municipal / Industrial / Bio-hazardous Waste
- Energy Efficiency - covering Appliances, Industrial Energy Efficiency & Green Buildings
- Green Mobility
- Clean Technologies

Providing Wings to Young Talent

Nurturing Individual Excellence

Mentoring Opportunities

Networking

Research Collaborations

Innovation & Entrepreneurship

Fellowship/Internship for Capacity Building

India-Australia Fellowship: 15 Fellowships annually to mid-career researchers to spend up to 6 months in **Australian** laboratories in science, engg and medical.

Raman-Charpak Fellowship: 25 fellowships annually to Indian PhD students to spend up to 6 months in **French** laboratories.

DST-JSPS Fellowship: 10 Fellowships annually to PDF and early career researchers in basic sciences to spend up to 6 months in **Japanese** laboratories.

India- South Korea Research Internship: 10 Internships annually to Indian PhD & PDF to spend up to one year in **S. Korean** laboratories.

India-UK Internship: 30 INSPIRE PhD students annually undertake 3-6 months internship in **UK** under Newton-Bhabha Program.

SERB Royal Society PD Fellowships: 15 Newton-Bhabha Fellowships for **UK** per year to Indian researchers covering STEM fields of up to 2 years duration.

Viterbi Internships: 20 student (bachelors & masters) internship in electrical engineering & computer sciences for 8 weeks at the **USC, USA** through IUSSTF.

Fellowship/Internship for Capacity Building

SERB Overseas Postdoctoral Fellowship: Introduce scientists & engineers in early stages of career to international collaborative research opportunities. Period up to 1 year. 50 slots for **USA** & 50 for **other countries**.

SERB Overseas Doctoral Fellowships: to undertake full time visiting doctoral research by Indian students in top universities of **Canada (2), UK (1) and USA (9)**.

SN Bose Scholars Program: 50 bachelors and masters student research internship/year of 10-12 weeks in **US universities** in STEM areas.

SERB-ERC Research Exchange: project based research exposure of one year to 5 Indian PhD/PDF in **European labs** under EU-India projects.

Energy R&D Fellowships: 15 fellowships at the PhD and young faculty level for research in renewable energy domains in **US labs** for period up to 1 year.

SAKURA Program: supported by JST, every year 60 INSPIRE school students are exposed to **Japanese** science and cultural ethos for a period of one week.

International Travel Support: SERB extends travel support to young researchers to attend **international events** for presenting their scientific work.

Fellowship/Internship for Capacity Building

SERB-MITACS: Industrial internships of 3-6 months for 30 Masters & PhD students/year in **Canadian** industry and academic institutions.

IGSTC Industrial Internship: 15-20 PhD students annually to undertake internships up to 6 months in **German** industry through IGSTC.

Visiting Doctoral Fellowship: 100 Indian PhD students/year can undertake 6-9 months of research immersion in **any foreign** institution as a part of the thesis.

DST-TWAS Researcher Exchange: TWAS would facilitate the placement of 50 INSPIRE fellows (PhD & PDF)/year at research institutions across **developing countries**

Networking & Mentoring

Frontiers of Science Symposium with Royal Society: to nurture contact between next generation scientists of **U.K. and India** across disciplines for conveying and deriving cross-disciplinary insights in STEM domains.

Frontiers of Engineering Symposium: with Humboldt Foundation to establish connect between **Indian and German** engineers and technologists across disciplinary boundaries. Provide **Connect Award** through IGSTC.

BRICS Young Scientists Forum: Theme based conclave of young researchers from **BRICS countries** to create a forum to engage and network on topical areas of STI. 2016 Forum hosted by India and 2017 by China.

Lindau Nobel Laureates Meeting: 25 student researchers participate and interact with Nobel Laureates and their fellow peers every year since 2001 at Lindau, **Germany**. Followed by 1 week exposure to German labs.

HOPE Meeting: Up to 10 Indian students at PhD and PD level participate in the HOPE meeting at **Japan** annually.

Asian Science Camp: Up to 25 undergraduate students participate every year in the Camp held at different **Asian countries**. India hosted the 2011 & 2016 camps.

Research Schemes

Max-Plank Partner Groups: young Indian returnee scientists from Germany are networked through the Partner Group with Max Plank Institutes in **Germany** for up to 5 years. 34 Partner Groups supported so far by DST & MPG.

DST-RSF Projects: Outstanding young Indian and **Russian** scientists below the age of 39 are supported for joint projects leading to directed basic research.

Advanced Research Awards with Royal Society: 2 years research award for mid career faculty for networking between leading research groups of **UK** and India.

Bilateral R&D Projects: All bilateral projects supported by DST has provision for PhD student mobility to the partner country laboratory up to a period of 3 months as a part of project work.

Access to Mega Science facilities: PhD students and PDF are given preference for undertaking experiments at **CERN, Elettra, KEK & Petra III.**

Innovation & Entrepreneurship

India Innovation Growth Program: PPP initiative between DST, Tata Trust & Lockheed Martin Corp. to identifying, handholding and accelerating innovative Indian technologies to global markets – ***University Challenge Track*** for students.

IRIS: Initiative for Research & Innovation in Science is a PPP program between DST and Intel Corp. offering platform for young innovators (class 5-12) to showcase their projects in an international fair, ISEF in USA with 70 countries participating. 15-20 students get selected every year.

Makers Lab: Initiative to be launched in partnership between DST and Intel Corp. towards establishing fab labs/tinkering labs for hands-on project based activity for school children. Target is 3000 student participation across 5 cities in India.

India-Israel Incubatees Network: 10 young technology incubatees from India and Israel will be networked through the T-Hub, Hyderabad and Start-up Zone, Israel.

Investing in Youths is investing into the Future!



With UK PM



With Belgium PM



With Australian PM



With Portuguese S&T Minister

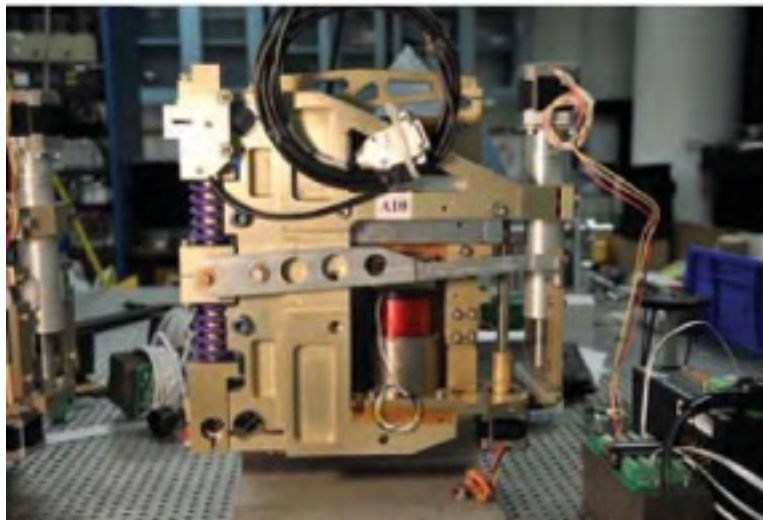


Signing of MoU for LIGO India

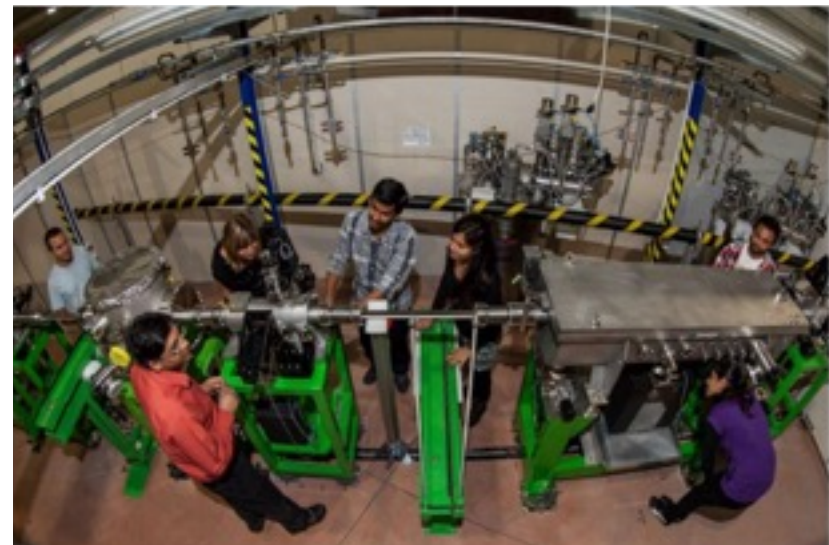


Signing of CERN Agreement

Thank You



Prototype of TMT Actuator



Twin Beamlines at Elettra, Italy