

# Astronomy & Astrophysics Division

Toward Collaboration with European Partners

Thomas Baycroft – T.D. Lee postdoctoral fellow

May 2026



李政道研究所

TSUNG-DAO LEE INSTITUTE



# People & Training Pipeline

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An international, fast-growing community with an active talent pipeline.

26

Faculty / Scientists

TDLI Astro

70+

PhD students

TDLI + SJTU DoA

24

Postdocs

22 Astro · 2 Lab plasma

13

Faculty alumni

worldwide

## ACTIVE RECRUITMENT & FELLOWSHIPS

- **T. D. Lee Postdoctoral Fellowship.** Prize, 3-year, international call.
- **Faculty positions — all astrophysics areas.** Open call via [academicjobsonline.org](https://academicjobsonline.org).
- **Siyuan Overseas Postdoc (SJTU).** Competitive package for incoming postdocs.
- **Lee Doctoral / PhD Program.** EU students very welcome to apply.

# Astronomy & Astrophysics Division — Research Landscape

Four complementary, synergistic research thrusts.

## 1 I. Galaxies & Cosmology

DESI · PFS · CSST · SKA



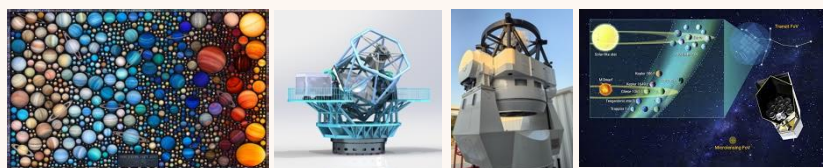
## 2 II. Relativistic & High-Energy

BH · GW · multi-messenger · EHT · LHAASO



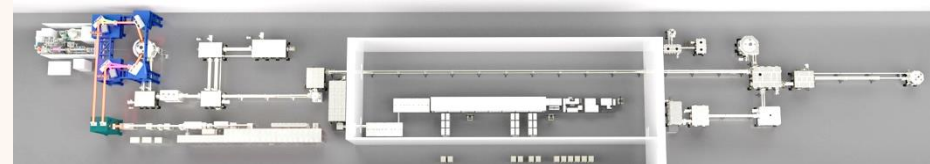
## 3 III. Exoplanets & Stellar

JUST-HWS · JUST-P / Tianyu · Earth 2.0 · Ariel



## 4 IV. Plasma & Lab Astrophysics

LAP facility — unique in Asia



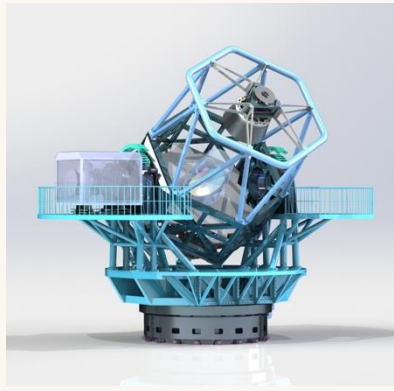
# Flagship Projects — Where We're Investing

Four programs that frame today's collaboration discussion.

## J JUST — 4.4 m telescope

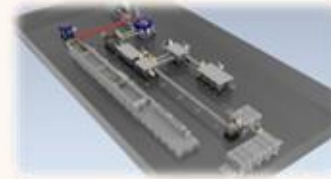
Lenghu (Qinghai). First light 2027. 3 goals:

1. Cosmology
2. Time-domain
3. Exoplanet



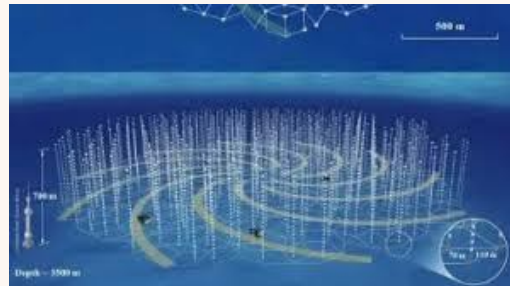
## L LAP — Laboratory Astrophysics

PW + ns lasers + 90 MeV e-Linac — extreme conditions in the lab.



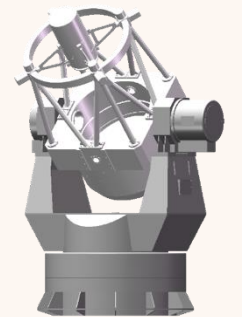
## T Trident — Neutrino telescope

Deep-sea  $\nu$  telescope in the South China Sea — cosmic-ray origins, multi-messenger sources.



## T JUST-P (Tianyu) — 1m telescope

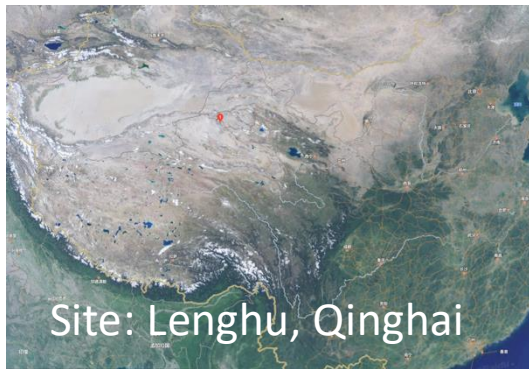
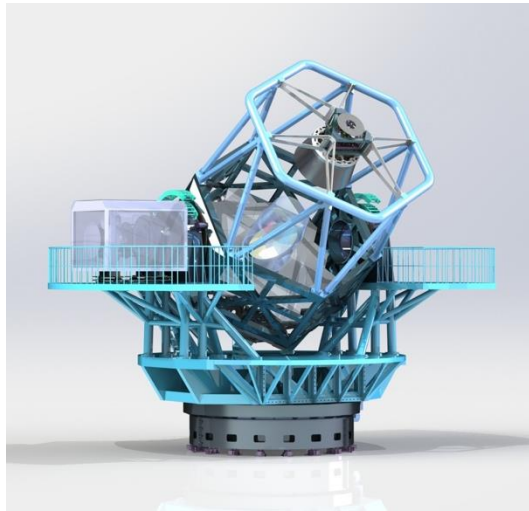
Wide-field survey · time-domain precursor at Lenghu dark-sky site.



# JUST — 4.4 m Spectroscopic Telescope

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Our flagship optical facility.



- **Site.** Lenghu — seeing  $\approx 0.6''$ .
- **Aperture.** 4.4 m alt-az, spectroscopic.
- **Instruments.** Long-slit · 2000-fiber MOS · HRS (or HWS).
- **Science.** Transients · galaxy/cluster surveys · exoplanet RV.
- **Timeline.** Dome 2026 · first light 2027.

## PARTNERSHIP OPENINGS

MOS · HRS · ToO networks · instrumentation · joint observing.

# LAP — Laboratory Astrophysics Platform

Recreate extreme astrophysical conditions in the lab — a unique combined facility at TDLI.

- **Facilities.** 3 PW fs laser + 700 J ns laser + 90 MeV e-Linac.
- **Target areas.** Laser Bay · TA-East (fs) · TA-West (3-beam combine).
- **Conditions.**  $I \sim 10^{22} \text{ W/cm}^2$  ·  $E \sim 9 \times 10^{13} \text{ V/m}$  ·  $B > 500 \text{ T}$ .
- **Diagnostics.** Single-shot multi-pulse e-probe — ps ·  $\mu\text{m}$ .
- **2026 science.** Weibel/Biermann · CFI · turbulent dynamo · KH.

## COLLABORATION ASKS

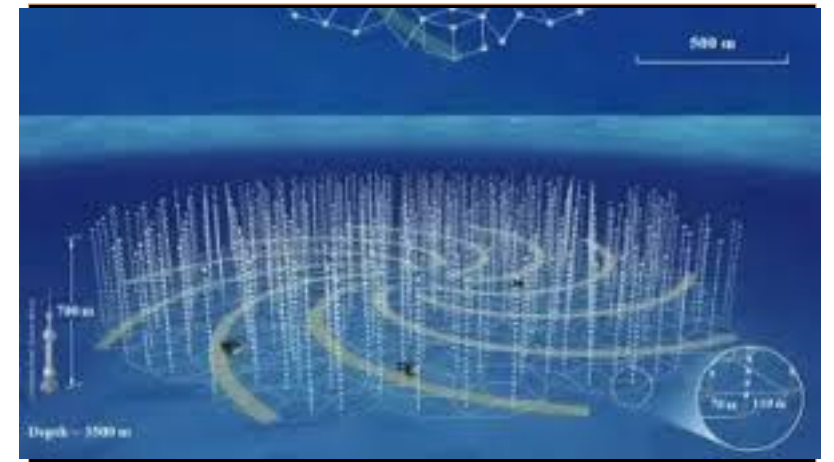
- Open beam time vs. fusion-locked facilities.
- Joint CFI campaign — pairs with FACET-II.
- Target design & FLASH/MHD R&D.
- Diagnostics exchange (PMQ, e-probes).
- PhD / postdoc co-supervision.



# TRIDENT — Deep-Sea Neutrino Telescope

Next-generation high-energy neutrino observatory in the South China Sea — SJTU/TDLI-led.

- **Detector.**  $\sim 7.5 \text{ km}^3$  array · 1,200 strings · 24,000 hybrid DOMs at 3.5 km depth.
- **Site.** Near-equator location  $\rightarrow 4\pi$  sky coverage, complements IceCube & KM3NeT.
- **Science.** Origin of cosmic rays · resolve diffuse  $\nu$  flux · all-flavor astrophysical sources (e.g. NGC 1068 within  $\sim 2$  yr).
- **Status.** T-REX pathfinder (2021) · Phase-I deployment underway · 2026 sea-trial of SPIDER deployer passed.
- **TDLI role.** Project HQ (PI D. Xu) · hDOM & in-situ calibration · reconstruction & multi-messenger analysis.



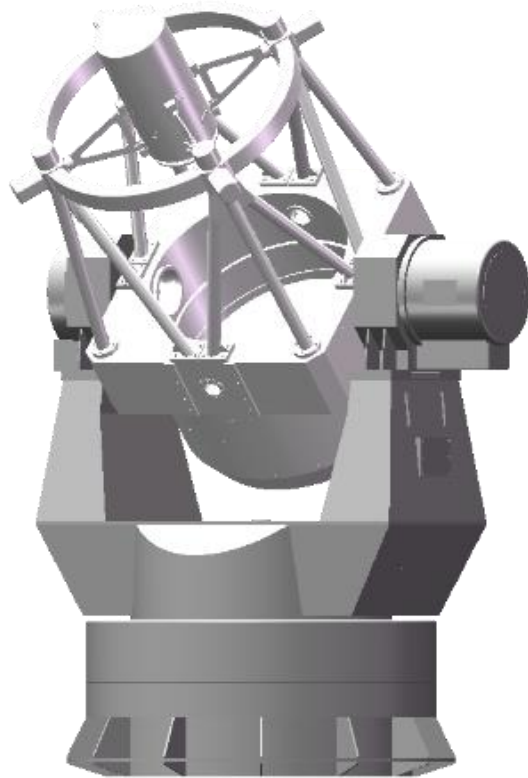
## COLLABORATION ASKS

- Joint analyses with KM3NeT / IceCube.
- Multi-messenger follow-up partnerships.
- hDOM & calibration R&D exchange.
- PhD / postdoc co-supervision.

# JUST-P / Tianyu — Planet Survey & Time-Domain Precursor

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1-m wide-field survey telescope at Lenghu — TDLI's near-term sky engine.



## WHAT IT IS

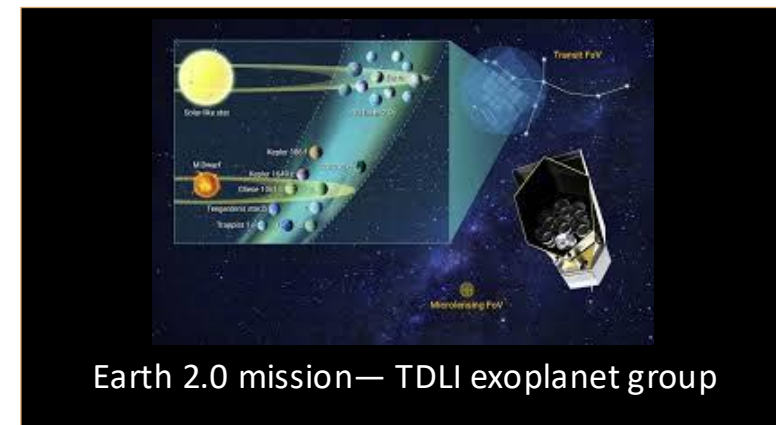
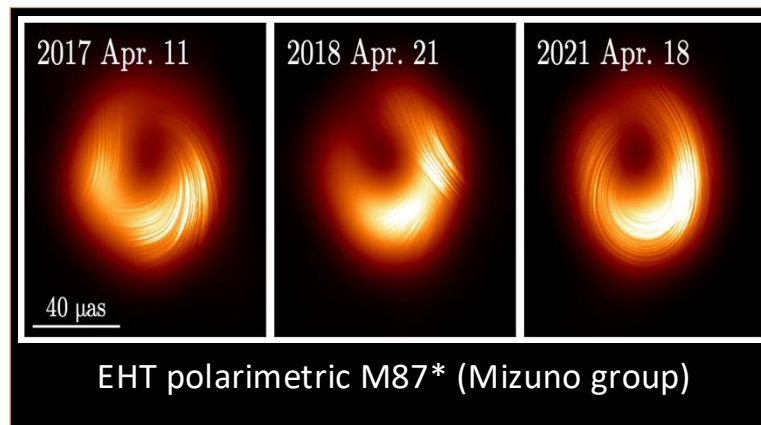
- **Telescope.** 1 m aperture,  $\sim 10 \text{ deg}^2$  FoV — wide-field imaging.
- **Site.** Lenghu, Qinghai — premier Chinese dark site.
- **Schedule.** First light ahead of JUST — precursor science engine.
- **Cadence.** Exoplanet transits; time-domain surveys: transients, AGN, variables.

## WHY EU PARTNERS SHOULD CARE

- **Northern-sky transients.** Real-time alerts for EU follow-up.
- **Bridges to Rubin / 4MOST.** Cross-cal, joint alert brokers.
- **Open-data PhD topics.** Transient classification, ML pipelines.
- **Multi-messenger anchor.** Kilonova / GRB counterparts with EU teams.

# Other Major Facilities & Participations

Beyond the flagships — broad international participation.



## Cosmology

CSST · DESI · PFS.

## High energy astrophysics

EHT · LHAASO · e-XTP.

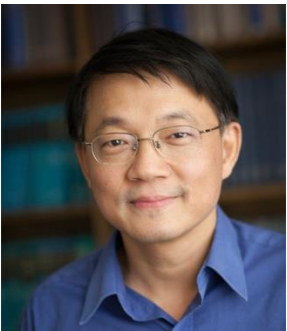
## Exoplanet

ET · Plato · Ariel.

# Relativistic/High-energy Astrophysics

## including time-domain, multi-messenger astrophysics

- Compact objects (BH, NS, WD), transient/explosive sources (SNs, GRBs, FRBs, TDEs)
- Gravitational wave astronomy
- Particle astrophysics: High-energy cosmic rays, gamma-rays and neutrinos, DM



Dong Lai



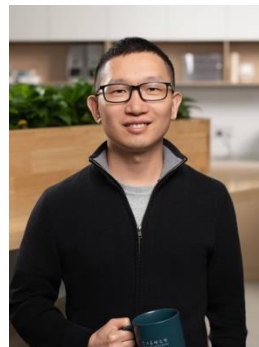
Yosuke  
Mizuno



Hao Zhou



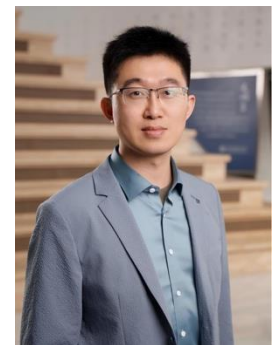
Zhen Pan



Jieshuang  
Wang



Longqing Yi



Yipeng Wu

# Plasma/Laboratory Astrophysics

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- Laser driven fusion and particle accelerators
- Laser-plasma physics
- QED
- Ultra-short electron pulses



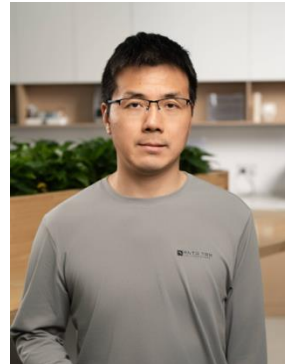
Jie Zhang



Zhengmin  
g Shen



Liejia Qian



Pengfei Zhu



Xiaojun Huang



Haijiao Jiang



Xulei Ge

# Galaxies and Cosmology

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- **Cosmology, large-scale structures**
- **Numerical simulations**
- **Galaxy groups and clusters**
- **Galaxy formation and evolution**
- **High redshift galaxies and reionization**



Yipeng Jing



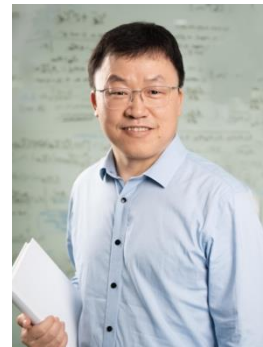
Pengjie Zhang



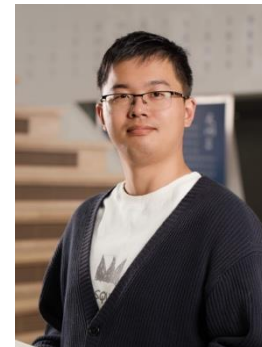
Xiaohu Yang



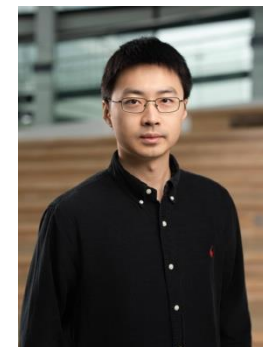
Zu Ying



Xianzhong Zheng



Yizhou Gu

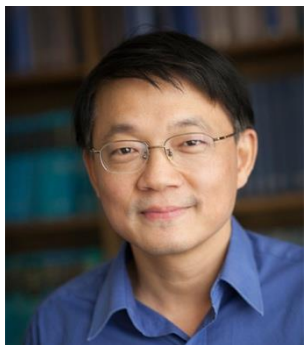


Mengtao Tang

# Exoplanet Science

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- Exoplanet detection and stellar physics
- Planet formation and dynamics
- Exoplanet atmospheres and interiors



Dong Lai



Xianyu Tan



Masahiro Ogihara



Fabo Feng



Darius  
Modirrousta-Gallian



Qinghui Sun

# Conferences, Schools & Activities

A vibrant calendar of meetings hosted at TDLI throughout the year.

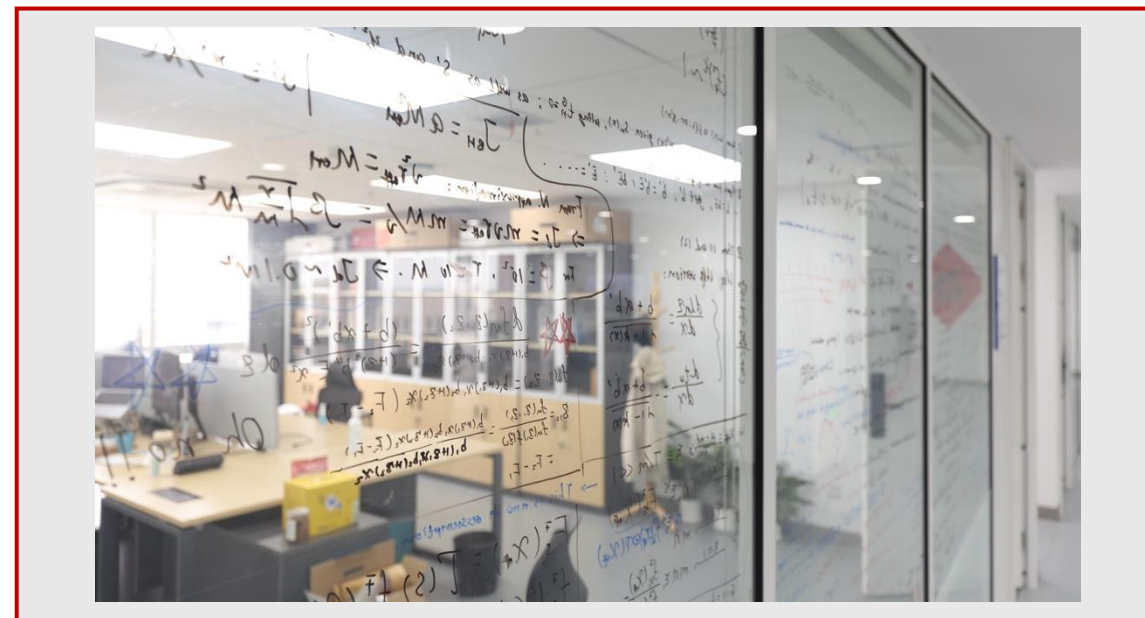
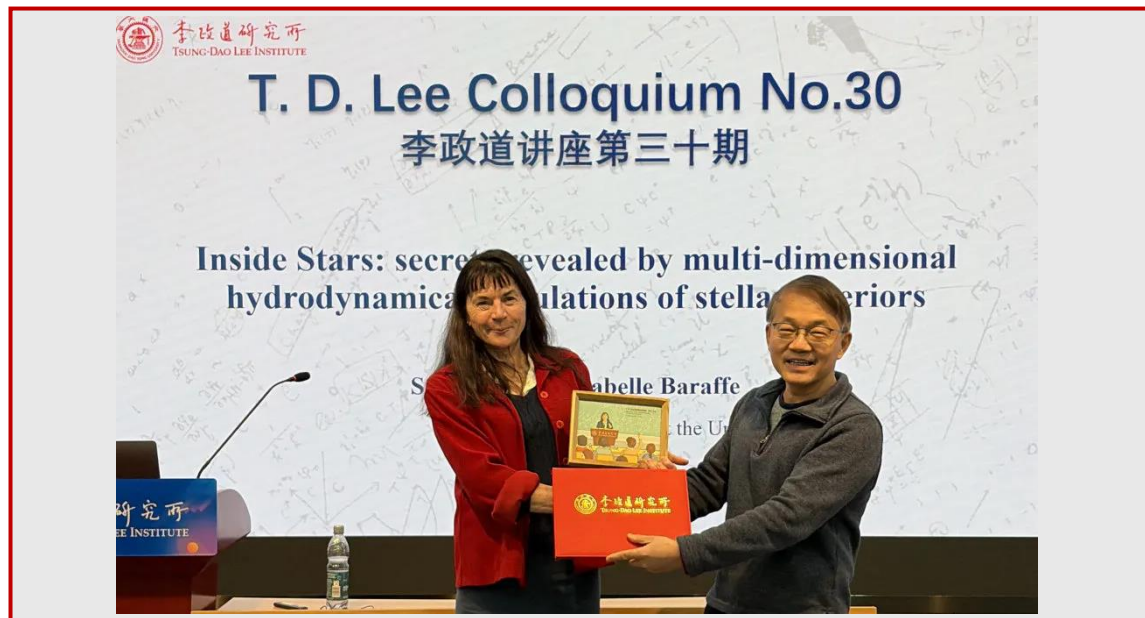


Annual symposia & topical workshops — 200+ international speakers each year, covering cosmology, GWs, dark matter & particle astrophysics.

Summer/winter schools, Lee Open Day & public outreach — funded student participation, applications open spring & autumn.

# Visiting TDLI

Opportunities for short- and long-term research visits in Shanghai.



Short visits (1–4 weeks) for seminars & collaboration sprints; long visits (2–6 months) with desk space, computing access & full integration.

Lee Visiting Professorships for 6–12 month sabbaticals. Funded travel, on-campus housing & visa support — contact TDLI Astro.

# PhD & Postdoc Opportunities

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Join TDLI as a graduate student or fellow — competitive packages, world-class science.

## 2026 SJTU Tsung-Dao Lee Institute International Graduate Admissions

Fall 2026 admissions for Tsung-Dao Lee Institute (TDLI) opened on 15 October 2025. Applicants from all over the world are welcome to [apply](#) for graduate programs at TDLI.



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PhD program: 4–5 year tracks via SJTU, English-taught, co-supervision with EU partners welcome. Applications Oct–Mar.

T.D. Lee Postdoctoral Fellowships (3-yr, independent)  
Lots of funding programmes to support independent postdocs (e.g. Siyuan fellowship from SJTU)  
PI-hosted group postdocs. Details: [tdli.sjtu.edu.cn/careers](http://tdli.sjtu.edu.cn/careers).

# What We Can Build Together

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A menu of collaboration modes — pick & mix what fits your institute.

## **S** Student & PhD exchange

Co-supervised PhDs · 2–6 month visits · summer/winter schools  
· Lee Open Day.

## **P** Postdoctoral mobility

T. D. Lee Fellowship · Siyuan Overseas · Joint TDLI–EU postdocs ·  
project posts.

## **V** Visiting program & seminars

2-week to multi-month visits, fully funded. Bilateral seminars ·  
reciprocal hosting.

## **J** Joint projects, data & events

CSST + Euclid · ET + PLATO + Ariel · JUST observing time · co-  
organised events.