

# The International Pulsar Timing Array & How To Get Involved



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# Contents

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- What is the IPTA?
- How is it organized?
- Where do I get information?
- How can I get involved?

# What is the IPTA?

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- A consortium of consortia
- Aim: “to facilitate collaboration [...] and promote progress [...]”

# What is the IPTA? - Current Situation



Figure Credit: Thankful Cromartie

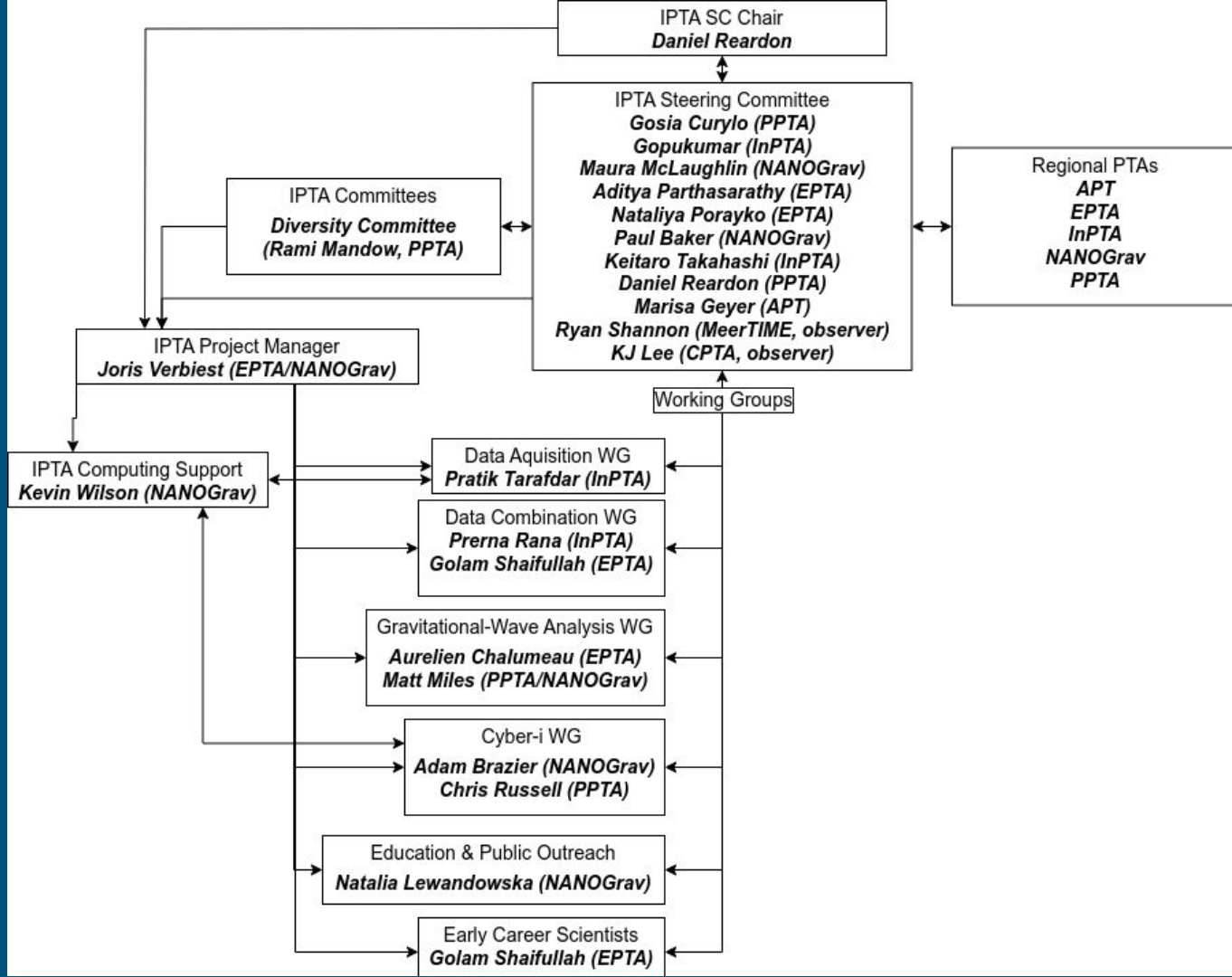
# What is the IPTA? - Current Situation

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- A consortium of consortia
- APT, EPTA, InPTA, NANOGrav, PPTA
  - ◆ Every member of every member consortium is an IPTA member!
- Data-sharing agreements with MeerTIME, CHIME
- Observer status for CPTA

But... this can change!

# How is the IPTA organized?





# How is the IPTA organized?

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- Management/Leadership : IPTA Steering Committee  
= 2 representatives from each PTA + previous chair + IPTA manager

Currently:

Aditya Parthasarathy, Nataliya Porayko (EPTA),  
Gopakumar, Keitaro Takahashi (InPTA),  
Paul Baker, Maura McLaughlin, Megan DeCesar (NANOGrav),  
Daniel Reardon (chair), Gosia Curylo (PPTA),  
Marisa Geyer (APT),  
Ryan Shannon (MPTA), Kejia Lee (CPTA), Joris Verbiest (manager)

- Working Groups
- Committees

# How is the IPTA organized?

---

## Committees:

- Steering Committee (Chair: Daniel Reardon)
- Diversity Committee (Chair: Rami Mandow)

# How is the IPTA organized?

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## Working Groups:

- Data Acquisition (Chair: Pratik Tarafdar)
- Data Combination (Chairs: Prerna Rana, Golam Shaifullah)
- Gravitational-Wave Analysis (Chairs: Aurélien Chalumeau, Matt Miles)
- Early Career Scientists (Chair: Golam Shaifullah)
- Education & Public Outreach (Chair: Natalia Lewandowska)
- Cyberinfrastructure (Chair: Adam Brazier, Chris Russell)

# Where do I get information?

- IPTA wiki:  
<https://wiki.ipta4gw.org>

Logged in as: Joris Verbiest (jorisverbiest) [Update Profile](#) [Log Out](#)

 IPTA Wiki

[Recent Changes](#) [Media Manager](#) [Sitemap](#)

[e:](#) • [agreements\\_policies\\_constitution](#) • [ipta\\_constitution](#) • [ipta\\_steering\\_committee\\_meeting\\_minutes](#) • [ipta\\_committees](#) • [diversity\\_committee](#) • [here](#) • [start](#)

## International Pulsar Timing Array WIKI

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### Policies and organisation

- [Agreements/Policies/Constitution](#)
- [E-Mail Exploders](#)

### Committees and Working Groups

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### Projects and Publications

- [Projects](#)
- [Papers in preparation](#)
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### Resources

- [IPTA Telecons](#) ← **NEW!**
- [Conferences & Meetings](#)
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- [Mentor Program](#)
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- [Acknowledgement for Telescopes, Observatories, Funding Projects \(LaTeX -- for publications\)](#)

## Meetings and Workshops

- [IPTA 2025 \(Pasadena, USA\): !\[\]\(9f2afbf61549a36bc217361482e18fc1\_img.jpg\) Link](#)
- [IPTA 2024 \(Milan/Sexten, Italy\): !\[\]\(c140bb417c6b7214558aa474821a52d3\_img.jpg\) Link](#)
- [IPTA 2023 \(Port Douglas, Aus\): \[IPTA2023\]\(#\)](#)
- [IPTA 2022 \(Zoom, India\): !\[\]\(bbf109242f0dfc9e538a5e5fc8b68775\_img.jpg\) Link](#)
- [IPTA 2021 \(Zoom, Aus\)](#)
- [IPTA 2020 \(Cancelled\)](#)

## Agreements/Policies/Constitution





On this page we give the Constitution, Policies and Agreements under which the IPTA operates

## Constitution

- [IPTA Constitution](#) (15 March 2012)

## Policies and Agreements

## General

-  [Project and Publication policy](#) (January 2025)
- [Searching Statement of Intent](#) (7 September 2012)
-  [Code of conduct/Anti-harassment policy](#) (January 2024)
-  [Working Groups](#)
-  [Continuous Wave Task Force Terms of Reference](#)

## Data Sharing

-  [Data-Sharing Agreement](#) (26 Sep 2023)
-  [MeerTIME/IPTA Data-sharing Agreement](#) (14 Feb 2023)
-  [CHIME Data-Sharing Agreement](#) (December 2023)

## Membership

-  [Ratified Membership Policy](#) (28 August 2018)
-  [InPTA joining agreement](#) (9 March 2021)
-  [APT joining agreement](#) (7 April 2025)

## Old &amp; Outdated

- [Publication Policy](#) (15 March 2012)
- [Detection Protocol](#) (2014)
- [Original Data-Sharing Agreement](#) (2009)
-  [Code of conduct/Anti-harassment policy](#) (March 2017)

## 3P+-related

-  [3+P concept agreement](#) (6 July 2021)
-  [terms\\_of\\_reference\\_for\\_3p\\_committee\\_and\\_the\\_detection\\_committee.pdf](#)

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- [IPTA 2023 \(Port Douglas, Aus\): \[IPTA2023\]\(#\)](#)
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- [IPTA 2021 \(Zoom, Aus\)](#)
- [IPTA 2020 \(Cancelled\)](#)

## IPTA Contacts

Recipients	Address
IPTA Steering Committee Chair	✉ <a href="mailto:iptasc_chair@lists.pulsarastronomy.net">iptasc_chair@lists.pulsarastronomy.net</a>
IPTA Steering Committee Members	✉ <a href="mailto:iptasc@lists.pulsarastronomy.net">iptasc@lists.pulsarastronomy.net</a>
All IPTA Members <b>Please use with discretion!</b>	✉ <a href="mailto:ipta@lists.pulsarastronomy.net">ipta@lists.pulsarastronomy.net</a>
3P+ Committee Members	✉ <a href="mailto:ipta-3p@lists.pulsarastronomy.net">ipta-3p@lists.pulsarastronomy.net</a>
Detection Committee Members	✉ <a href="mailto:dc@ipta4gw.org">dc@ipta4gw.org</a>

Working Group	Address
Data Acquisition	✉ <a href="mailto:ipta-da@ipta4gw.org">ipta-da@ipta4gw.org</a>
Data Combination	✉ <a href="mailto:ipta-dcwg@lists.pulsarastronomy.net">ipta-dcwg@lists.pulsarastronomy.net</a>
GW Analysis	✉ <a href="mailto:gwa@ipta4gw.org">gwa@ipta4gw.org</a>
Early Career Scientists	✉ <a href="mailto:pecs@lists.pulsarastronomy.net">pecs@lists.pulsarastronomy.net</a>
Education & Public Outreach	✉ <a href="mailto:epo@ipta4gw.org">epo@ipta4gw.org</a>
Cyber-infrastructure	✉ <a href="mailto:cyberi@ipta4gw.org">cyberi@ipta4gw.org</a>

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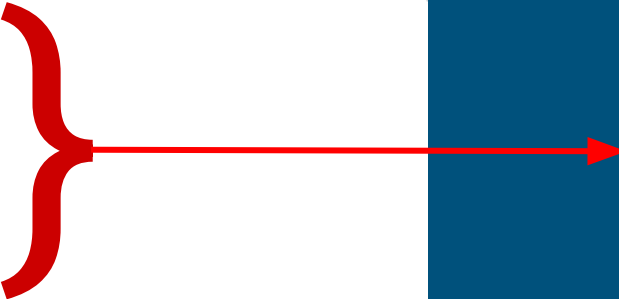
- Projects
- Papers in preparation
- Memos
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Mostly meeting minutes,  
also some contact  
information

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# The IPTA Mentor Program

## IPTA Mentor Program

Welcome to the IPTA Mentor Program. In this program, we aim to facilitate an opportunity for student and early-career researchers/scientists to work with a more senior member of the IPTA, gaining useful skills, knowledge and experience.

This pilot program will commence in 2024.

[Find out more about how the program works](#)

[Report an Issue](#)

[Edit](#)

### Mentors

For our 2024 intake, click on links below to view the profiles of each of the mentors:

Mentors	Mentoring Topics
<a href="#">Manjari Bagchi (InPTA)</a>	science questions; practical science; leading papers; living / working abroad; work / organisational culture
<a href="#">Sarah Burke-Spolaor (NANOGrav)</a>	faculty applications; postdoc applications; choosing mentors; the funding system and grant proposals in the USA ; gravitational-wave astrophysics
<a href="#">Aurélien Chaluveau (EPTA)</a>	fighting imposter syndrome; finding jobs; DEI; living in foreign countries; working in a large collaboration
<a href="#">Vivek Venkatraman Krishnan (EPTA)</a>	grant proposal writing; programming; living in Germany
<a href="#">Natalia Lewandowska (NANOGrav)</a>	job applications; CV vs. resume; two-body problem; living abroad; getting to know new cultures
<a href="#">James McKee (EPTA/ NANOGrav)</a>	neurodiversity; presenting; job searching; moving countries; finding collaborators
<a href="#">Aditya Parthasarathy (EPTA)</a>	pulsar timing; nanoHertz GW searches; pulsar emissions; population studies; radio / Gamma-ray analysis
<a href="#">Delphine Perrodin (EPTA)</a>	living / working abroad; work / life balance; DEI; career advice; finding jobs
<a href="#">Andrea Possenti (EPTA)</a>	career advice; project management; practical science; grant applications; large collaborations fellowships
<a href="#">Golam Shaifullah (EPTA)</a>	pulsar timing; data combination; Python coding; proposal writing; mental health and well-being
<a href="#">Caterina Tiburzi (EPTA)</a>	applying for grants / fellowships; networking; DEI; living / working abroad, working in large collaborations
<a href="#">Joris Verbiest (EPTA/ NANOGrav)</a>	research; networking; career planning/funding; soft skills; living abroad
<a href="#">Sarah Vigeland (NANOGrav)</a>	career advice; GW scientific questions; leading papers, project management, finding jobs

[Edit](#)

### Connect with a Mentor Today!

Let us know, by email us at [mentoring@lists.pulsarastronomy.net](mailto:mentoring@lists.pulsarastronomy.net) that you would like to participate in the mentor program and have selected a mentor. We'll take it from there and facilitate your connections. Please also read the mentor program guidelines and IPTA code of conduct.

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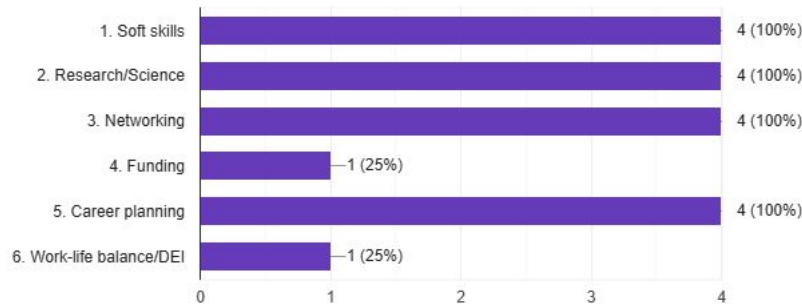
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### Content of mentorship

At the start of the program, in which of the listed areas did you think mentorship was desirable? (multiple choice allowed)

[Copy](#)

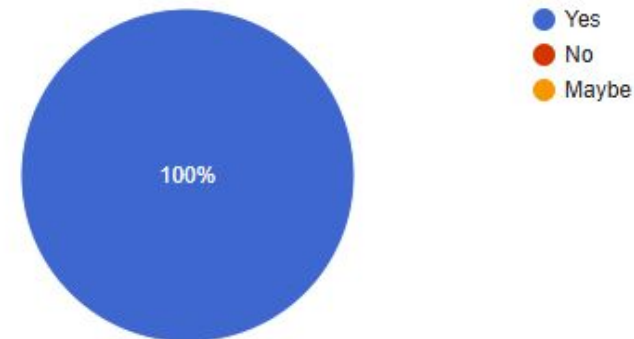
4 responses



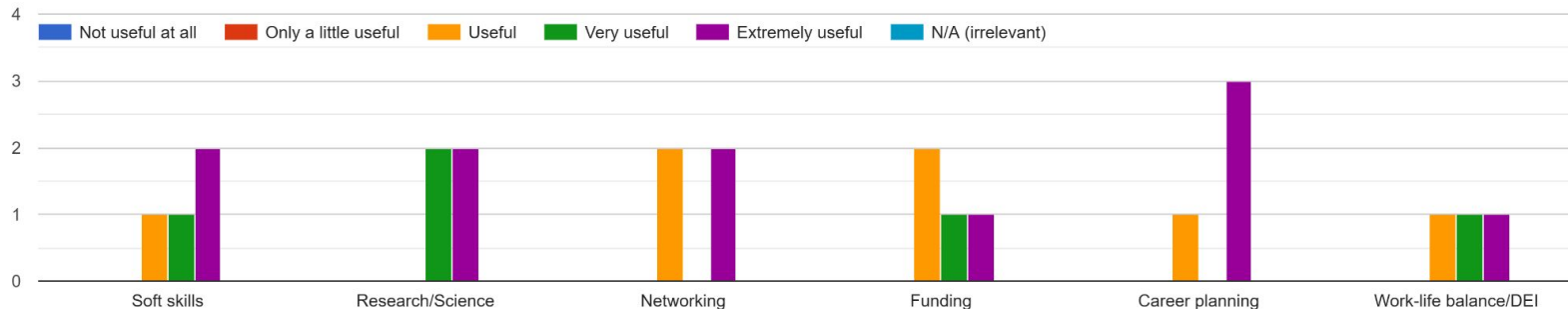
# The IPTA Mentor Program

Would you recommend this program to an IPTA colleague?

4 responses



How useful was mentoring in different areas?



# Where do I get information?

- IPTA wiki:  
<https://wiki.ipta4gw.org>
- Slack (ask Kevin for an account!)

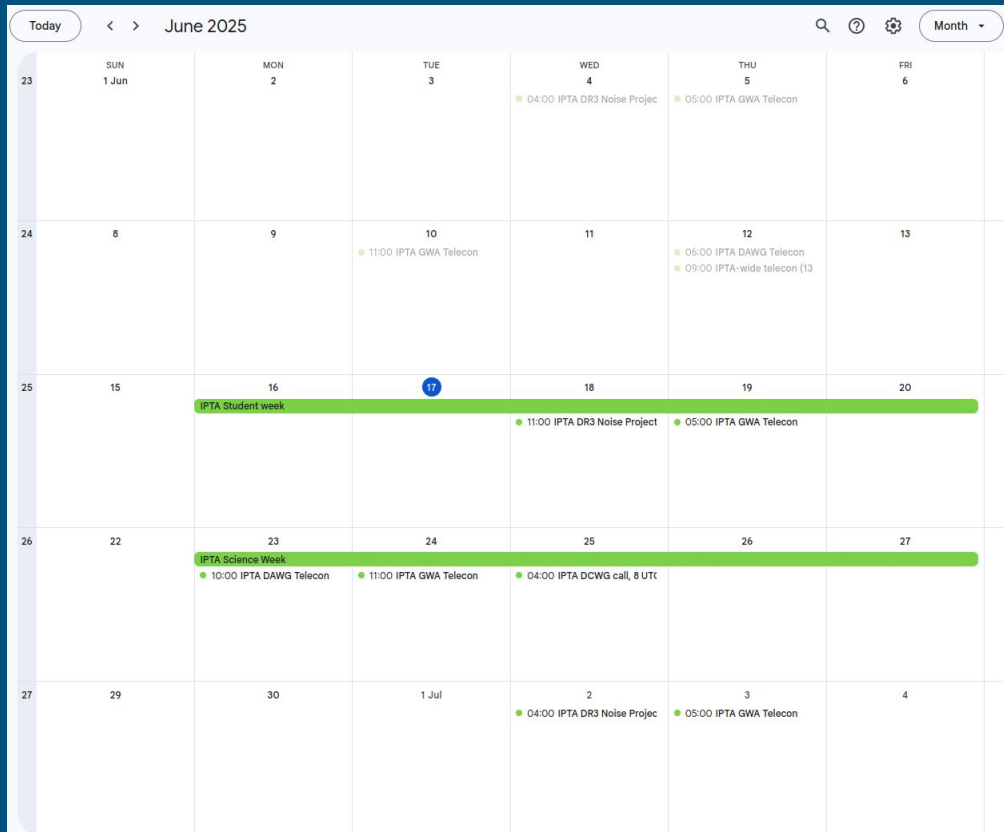
The screenshot displays the Slack interface for the IPTA workspace. On the left is a dark sidebar with navigation options: Home, DMs, Activity, Later, and Canvases. Below these are channel lists for 'Threads', 'Huddles', 'Drafts & sent', and a list of channels including #data\_combination, #ipta-dr3-single-pulsar..., #low-f-combination, #low-frequencies, #Aurélien Chalumeau, ..., #Mentoring, #ipta-mentoring, #IPTA\_Management, #ipta-cyber-i, #ipta-del, #Channels, #clocks, #data\_acquisition\_wg, #general (highlighted), #ipta-gw, #ipta-noise, #ipta-wide-telecons, #le-pont, #random, #simulations\_wg, #wideband\_timing, #dr3\_managers, #dr4\_session, #pasadena\_soc, #ska-pta-chapter, and #gwa\_support\_forum. The main area shows the '# general' channel with a header 'Company-wide announcements and work-based matters'. It includes a message from Tuesday, June 10th about a 'buddy system' for international citizens, a 'Clean Buddy Sign-up' form, and a message from Wednesday, June 11th by Nataliya P. announcing a 90-minute telecon on June 12th. A follow-up message from Nataliya P. at 6:44 AM provides a Google Drive link for recordings and mentions Kevin Wilson. A final message from Perna Rana at 8:35 AM thanks Nataliya P. The bottom of the screen shows a message input field with various formatting and sharing icons.

# Where do I get information?

- IPTA wiki:

<https://wiki.ipta4gw.org>

- Slack (ask Kevin for an account!)
- IPTA Google Calendar (ask me!)



# Where do I get information?

- IPTA wiki: <https://wiki.ipta4gw.org>
- Slack (ask Kevin for an account!)
- IPTA Google Calendar (ask me!)
- Your IPTA Steering Committee Representatives
- Me (I'm responsible for communication...) – Joris.Verbiest@ucf.edu
- Ask Kevin Wilson (IPTA "Computing Resource") – kpwilson@pm.me

# How can I get involved?

---

- Best way is by ***joining a Working Group***
  - Every IPTA member is welcome to attend every telecon.
  - All the work originates in, is discussed in, and is carried out within the WGs
  - IPTA SC consults with WGs and PTAs
  - ***Ask WG or Committee chairs how you can help***
- Join the ***Mentor Program!***
- Feel free to ***contact your SC representative!***
- Participate in IPTA discussions within your own PTA
- Attend the IPTA-wide telecons
- Feel free to get in touch with me ([Joris.Verbiest@ucf.edu](mailto:Joris.Verbiest@ucf.edu))
- Get a ***wiki*** account, ***Slack*** account, sign up for the Google ***Calendar***



# Additional Slides: IPTA History (not up-to-date)

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# History

## The International Pulsar Timing Array

**R N Manchester (for the IPTA)**

CSIRO Astronomy and Space Science, PO Box 76, Epping NSW 1710, Australia

E-mail: [dick.manchester@csiro.au](mailto:dick.manchester@csiro.au)

Received 28 May 2013, in final form 4 September 2013

Published 4 November 2013

Online at [stacks.iop.org/CQG/30/224010](http://stacks.iop.org/CQG/30/224010)

### Abstract

The International Pulsar Timing Array (IPTA) is an organization whose *raison d'être* is to facilitate collaboration between the three main existing PTAs (the EPTA in Europe, NANOGrav in North America and the PPTA in Australia) in order to realize the benefits of combined PTA data sets in reaching the goals of PTA projects. Currently, shared data sets for 50 pulsars are available for IPTA-based projects. Operation of the IPTA is administered by a Steering Committee consisting of six members, two from each PTA, plus the immediate past Chair in a non-voting capacity. A Constitution and several Agreements define the framework for the collaboration. Web pages provide information both to members of participating PTAs and to the general public. With support from an NSF PIRE grant, the IPTA facilitates the organization of annual Student Workshops and Science Meetings. These are very valuable both in training new students and in communicating current results from IPTA-based research.

PACS numbers: 01.10.Hx, 97.60.Gb, 04.30.Tv

(Some figures may appear in colour only in the online journal)

# History

- First “IPTA Meeting” at AO, 2008
- Presented at Amaldi meeting in 2009

## Classical and Quantum Gravity

### The International Pulsar Timing Array project: using pulsars as a gravitational wave detector

G Hobbs<sup>1</sup>, A Archibald<sup>2</sup>, Z Arzoumanian<sup>3</sup>, D Backer<sup>4</sup>, M Bailes<sup>5</sup>, N D R Bhat<sup>5</sup>, M Burgay<sup>6</sup>, S Burke-Spolaor<sup>1,5</sup>, D Champion<sup>1,7</sup>, I Cognard<sup>8</sup> [+ Show full author list](#)

Published 6 April 2010 • 2010 IOP Publishing Ltd

[Classical and Quantum Gravity, Volume 27, Number 8](#)

**Citation** G Hobbs *et al* 2010 *Class. Quantum Grav.* **27** 084013

**DOI** 10.1088/0264-9381/27/8/084013



Article PDF

[References](#) ▾

[+ Article and author information](#)

### Abstract

The International Pulsar Timing Array project combines observations of pulsars from both northern and southern hemisphere observatories with the main aim of detecting ultra-low frequency ( $\sim 10^{-9}$ – $10^{-8}$  Hz) gravitational waves. Here we introduce the project, review the methods used to search for gravitational waves emitted from coalescing supermassive binary black-hole systems in the centres of merging galaxies and discuss the status of the project.

# History

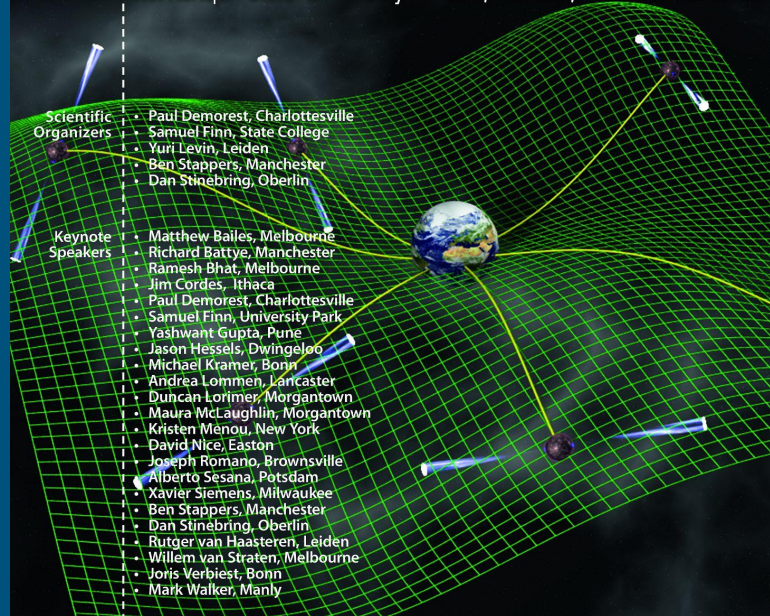
- First “IPTA Meeting” at AO, 2008
- Presented at Amaldi meeting in 2009
- Second IPTA Meeting (*with* student week!) in Leiden, 2010
- Steering Committee established 2011

Lorentz  
center

## IPTA 2010

### Detecting Gravitational Waves with Pulsars

Workshop: June 21 – July 2 2010, Leiden, The Netherlands



Scientific  
Organizers

- Paul Demorest, Charlottesville
- Samuel Finn, State College
- Yuri Levin, Leiden
- Ben Stappers, Manchester
- Dan Stinebring, Oberlin

Keynote  
Speakers

- Matthew Bailes, Melbourne
- Richard Battye, Manchester
- Ramesh Bhat, Melbourne
- Jim Cordes, Ithaca
- Paul Demorest, Charlottesville
- Samuel Finn, University Park
- Yashwant Gupta, Pune
- Jason Hessels, Dwingeloo
- Michael Kramer, Bonn
- Andrea Lommen, Lancaster
- Duncan Lorimer, Morgantown
- Maura McLaughlin, Morgantown
- Kristen Menou, New York
- David Nice, Easton
- Joseph Romano, Brownsville
- Alberto Sazana, Potsdam
- Xavier Siemens, Milwaukee
- Ben Stappers, Manchester
- Dan Stinebring, Oberlin
- Rutger van Haasteren, Leiden
- Willem van Straten, Melbourne
- Joris Verbiest, Bonn
- Mark Walker, Manly

Topics

- Measuring Nanohertz Gravitational Waves via Pulsar Timing
- Practical Data Analysis Tutorials
- Astrophysics of Nanohertz Gravitational Waves Sources
- Pulse Time of Arrival Measurement
- Effect of the Interstellar Medium
- Gravitational Waves Detection Strategies for Pulsar Timing

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# History

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- First “IPTA Meeting” at AO, 2008
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- Oct 2011: Start of the first IPTA data combination

## **First phase of the IPTA Combined Limit Paper Working Group: The Committee of Six**

Below is a list (in reverse chronological order) of the actions undertaken in the first phase of the project, by the “committee of six”.

### **06 October 2011**

On 06 October 2011, a working group was convened to facilitate the creation of a joint IPTA paper with a limit on the gravitational wave background. The original committee was invited by the IPTA SC and consisted of two members of each consortium: Paul Demorest, George Hobbs, Rick Jenet, Ryan Shannon, Rutger van Haasteren and Joris Verbiest.

- ## the first IPTA data combination

J. P. W. Verbiest,<sup>1,2★</sup> L. Lentati,<sup>3</sup> G. Hobbs,<sup>4</sup> R. van Haasteren,<sup>5</sup> P. B. Demorest,<sup>6</sup>  
G. H. Janssen,<sup>7</sup> J.-B. Wang,<sup>8</sup> G. Desvignes,<sup>2</sup> R. N. Caballero,<sup>2</sup> M. J. Keith,<sup>9</sup>

PTA subset	GWB limit ( $\times 10^{-15}$ )	Published limit ( $\times 10^{-15}$ )	Reference
NANOGrav	4.5	1.5	Arzoumanian et al. (2016)
EPTA	3.3	3.0	Lentati et al. (2015)
PPTA	2.8	1.0	Shannon et al. (2015)
IPTA	1.7		

## From spin noise to systematics: stochastic processes in the first International Pulsar Timing Array data release

L. Lentati,<sup>1★</sup> R. M. Shannon,<sup>2,3</sup> W. A. Coles,<sup>4</sup> J. P. W. Verbiest,<sup>5,6</sup> R. van Haasteren,<sup>7</sup>  
J. A. Ellis,<sup>7</sup> R. N. Caballero,<sup>6</sup> R. N. Manchester,<sup>2</sup> Z. Arzoumanian,<sup>8</sup> S. Babak,<sup>9</sup>



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- Feb/May 2016: Publication of the first IPTA data combination
- Oct 2019: Second IPTA data release

## The International Pulsar Timing Array: second data release

B. B. P. Perera<sup>1,2</sup>★, M. E. DeCesar<sup>3</sup>★, P. B. Demorest<sup>4</sup>, M. Kerr<sup>5</sup>, L. Lentati<sup>6</sup>,  
D. J. Nice<sup>3</sup>, S. Osłowski<sup>7</sup>, S. M. Ransom<sup>8</sup>★, M. J. Keith<sup>1</sup>, Z. Arzoumanian<sup>9</sup>

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- Oct 2019: Second IPTA data release published
- March 2021: InPTA joins
- April 2022: IPTA WGs Formally established (under discussion since 2017)
- Dec 2022: Start of AccelNet project (IPTA Computing Infrastructure + Manager)