REPORT ON THE RADIONET3 NETWORKING ACTIVITY

TITLE: EUROPEAN PULSAR TIMING ARRAY: SPRING MEETING 2015

DATE:	*1-3 JUNE, 2015*	**TIME:**	(WHOLE DAY)
LOCATION:	*BONN, GERMANY*		
MEETING WEBPAGE	*http://www3.mpifr-bonn.mpg.de/staff/caball/EPTA_Spring_Meeting_2015.html*		
HOST INSTITUTE:	*MAX-PLANCK-INSTITUT FÜR RADIOASTRONOMIE*		
PARTICIPANTS NO:	*30*		
MAIN LEADER:	MPG		

Project supported by the European Commission
Contract no.: 283393

REPORT:

1. Programme of the meeting

Day 1:
10.00-11.00 - Morning/Welcome Coffee
* 11.00-11.10 – Welcome and Introduction (Michael Kramer, *Max-Planck-Institut für Radioastronomie)*

* 11.10-12.00 - Session: timing group
- Summary of paper I: Timing of EPTA pulsars (Gregory Desvignes, *Max-Planck-Institut für Radioastronomie*)
- Summary of paper II: DM measurements and corrections (Gemma Janssen, *University of Manchester*)
- Summary of paper III: Noise properties of the EPTA timing data (Nicolas Caballero, *Max-Planck-Institut für Radioastronomie*)

* 12.00-13.00 - Lunch / coffee

* 13.00-15.30 - Session: Future of the EPTA
- Low frequency observations continuation for EPTA (Gemma Janssen, *University of Manchester*)
- High frequency observations at Effelsberg and The new C+ receiver at Effelsberg
(Patrick Lazarus and Ramesh Karuppusamy, *Max-Planck-Institut für Radioastronomie*)
- Future of the LEAP and updates (Michael Kramer, *Max-Planck-Institut für Radioastronomie*)
- Discussion Session: Updating the EPTA projects list

* 15.30-16.00 - Coffee break

* 16.00-18.00 - Session: Data Analysis group
- Summary of paper IV: EPTA Limits on an Isotropic Background (Lindley Lentati, *University of Cambridge)*
- Summary of papers V: First limit on the anisotropy of a stochastic-isotropic GW Background (Stephen Taylor, *Jet Propulsion Laboratory*)
- Summary of paper VI: EPTA Limits on Continuous GW from Individual SMBH binaries (Antoine Petiteau, *Université Paris-Diderot*)
- Data analysis of the NUPPI data (Antoine Petiteau, U*niversité Paris-Diderot*)
- Binary coupling with the environment (Alberto Sesana, *University of Birmingham*)
-The orbital evolution of black-hole binaries due to galactic environments and associated GW inference strategies (Stephen Taylor, J*et Propulsion Laboratory*)

Day 2:
* 09.30-10.00 – Morning Coffee

* 10.00-12.00 - Session: New data and techniques
- Updates from the Sardinia Radio Telescop (Delphine Perrodin and Andrea Possenti, *INAF-Osservatorio Astronomico di Cagliari*)
- Update on Nançay pulsar timing with NUPPI (Lucas Guillemot, *Université d'Orléans*)
- Bayesian profile domain timing analysis (Lindley Lentati, *University of Cambridge*)
- Flux measurements at 21 cm of EPTA pulsars observed with Effelsberg (Eleni Graikou, *Max-Planck-Institut für Radioastronomie*)

* 12.00-13.15 - Lunch / coffee

* 13.15-14.00 - Session: LEAP
- Updates on LEAP: Observations, Projects and papers (Delphine Perrodin, *INAF-Osservatorio Astronomico di Cagliari-Italy* and Kuo Liu, *Max-Planck-Institut für Radioastronomie*)

* 14.00-15.30 - Session: IPTA
- Updates on the IPTA data set paper (Joris Verbiest, *Universität Bielefeld*)

- IPTA noise project update (Lindley Lentati, *University of Cambridge*)
- Pulse profile variation of PSR J1713+0747 from IPTA global campaign (Ben Perera, *University of Manchester*)

* 15.30-16.00 - Coffee break
* 16.00-17.00 – Discussions and collaborative work

Day 3:
* 09.30-10.00 – Coffee

* 10.00-12.00 - Session: Single source astrophysics
- Update on PSR J1518+4904 (Gemma Janssen, *University of Manchester*)
- Short-term DM variations towards J1509+5531 (Stefan Oslowski, *Universitët Bielefeld*)
- 21yr phase connected Vela timing analysis (Lindley Lentati,*University of Cambridge*)
- Update on PSR J1012+5307 (Nicolas Caballero, *Max-Planck-Institut für Radioastronomie*)
* 12.00-13.15 - Lunch / coffee

- 13.15-17.00 - Collaborative work
- 17.00 - End of the meeting

2. Scientific Summary

The European Pulsar Timing Array (EPTA) is a European collaboration with the main goal of directly detecting Gravitational Waves (GWs) in nHz regime using a pulsar-timing array (PTA), an ensemble of stable millisecond pulsars. The EPTA meeting takes place twice a year and is the main forum where EPTA members update each other on the progress of the projects, present results and formulate the strategy of the collaboration. The meetings are also a chance for members working together on projects to have the chance to sit together and solve problems and further plan the projects.

Undoubtedly, the highlight of this meeting was the announcement on the submission of the three gravitational wave papers from the collaboration. These papers were the first EPTA wide papers since 2011. It was a large step forward in the collaboration, since this is the first time that apart from a paper on limits on the amplitude of a stochastic GW background (GWB), we also submitted papers dealing with limits on the possible anisotropy in the GWB and on GW signals from single super-massive black hole binary systems. This also signifies the first set of papers that were based on an EPTA data set that included all the legacy high precision pulsar timing data from the EPTA telescopes. The data and their timing and noise analysis procedures were also presented in the meeting; the two papers associated papers which will soon be publish, together with the GW papers are the culmination of the work done in the EPTA since the projects were planned in the 2011 Fall EPTA meeting.

Another highlight, was the announcement of the upcoming submission of the first LEAP paper. LEAP, the Large European Array for Pulsars, is the an interferometer composed of the five EPTA telescopes which is equivalent to a fully steerable 194-m in diameter radio telescope. It currently performs timing observations at 21cm (L-band), and improves the measurement precisions by e.g. a factor of 2-3 compared to Effelsberg.

During the meeting, we were also presented new data analysis techniques under development as well as results using some of the new generation of pulsar timing instruments, some of which have been in use for about 5 years. Other instruments have only been recently tested. These results formed the basis on the discussion for the future observing strategies in the EPTA. Issues such as the best frequency bands to observe given the pulsar properties and radio-frequency interference environment were taken into consideration.

The detection of GWs is a very complicated task and requires many years of high precision, properly calibrated data. The latest limits on the amplitude of the GWs from the various collaborations indicate that this signal may be significantly weak and therefore the time needed for detection is unknown. It is therefore vital to take advantage of the timing data collected in

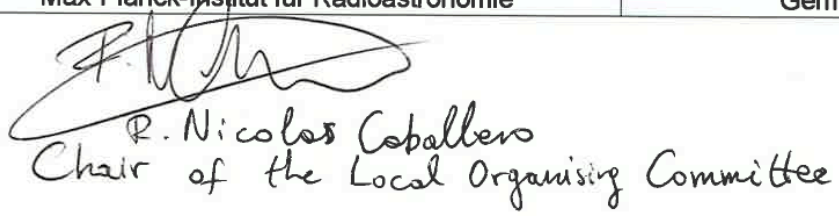
order to publish non-GW papers while still working on GW projects. Such projects include tests of gravity theories in the strong gravity regime, equations of state of ultra-dense matter, stellar binary evolution and interstellar medium studies. This has been done very successfully so far by the EPTA and is a major factor in keep getting telescope time and funding. We therefore also had a session dedicated to non-GW projects carried out in the collaboration and discussed new ideas.

Participation: In total, there were 30 participants, two of which participated via videoconference.
Women representation was at 17% (5 participants)
In terms of academic position, 30% were students (8 PhDs and 1 guest bachelor student working on a summer project), 33% (10 participants) were postdocs and 37% (11 participants) were senior members or tenure track position holders.
The participants originated from the following countries (number of participants in parentheses): Belgium (1), Canada(1), China(2), Cyprus(1), France(6), Germany(2), Greece(1), India (3), Italy(3), Netherlands(1),New Zeeland(1), Poland(1), UK(4), USA(1)
Participants worked at the time of the meeting in institutions in the following countries(number of participants in parentheses): France(4), Germany(15), Italy(2), Netherlands(1), UK(6), USA(2).

3. Attendance list (incl. participant names, affiliation and country) signed by the participants and confirmed by the organizer

Participant	Institute	Country
Pau Amaro-Seoane	Max-Planck-Institut für Gravitationsphysik	Germany
Caesy Brinkman	University of Vermont	United States of America
Nicolas Caballero	Max-Planck-Institüt für Radioastronomie	Germany
David Champion	Max-Planck-Institüt für Radioastronomie	Germany
Ismaël Cognard	Université d'Orléans	France
Gregory Desvignes	Max-Planck-Institüt für Radioastronomie	Germany
Eleni Graikou	Max-Planck-Institüt für Radioastronomie	Germany
Lucas Guillemot	Université d'Orléans	France
Maximilian Imgrund	LM-Universität München	Germany
Gemma Janssen	ASTRON - Netherlands Institute for Radio Astronomy	Netherlands
Ramesh Karuppusamy	Max-Planck-Institüt für Radioastronomie	Germany
Michael Kramer	Max-Planck-Institüt für Radioastronomie	Germany
Antoine Lassus	Max-Planck-Institüt für Radioastronomie	Germany
Patrick Lazarus s	Max-Planck-Institüt für Radioastronomie	Germany
Lindley Lentati	University of Cambridge	United Kingdon
Kuo Liu	Max-Planck-Institüt für Radioastronomie	Germany
James McKee	University of Manchester	United Kingdon
Stefan Oslowski	Universität Bielefeld	Germany
Benetge Perera	University of Manchester	United Kingdon
Delphine Perrodin	INAF - Osservatorio Astronomico di Cagliari	Italy
Antoine Petiteau	Université Paris	France
Andrea Possenti	INAF - Osservatorio Astronomico di Cagliari	Italy
Alberto Sesana	University of Birmingham	United Kingdon
Golam Shaifullah	Universität Bielefeld	Germany

Benjamin Shaw	University of Manchester	United Kingdon
Benjamin Stappers	University of Manchester	United Kingdon
Stephen Taylor	Jet Propulsion Laboratory	United States of America
Gilles Theureau	Université d'Orléans	France
Caterina Tiburzi	INAF - Osservatorio Astronomico di Cagliari	Italy
Joris Verbiest	Universität Bielefeld	Germany
Weiwei Zhu	Max-Planck-Institüt für Radioastronomie	Germany



4. Financial Report / RadioNet3 contribution

RadioNet3 contributed to the event by allocating 3000 Euro. The funding was used for traveling and accommodation of young post-docs, and for logisticx

Participant	Nationality
Caterina Tiburzi	Italy
James McKee	UK
Golam Shaifullah	India
Stefan Oslowski	Poland
Gemma Janssen	Netherlands
Pau Amaro-Seoane	Spain
Delphine Perrodin	France
Joris Verbiest	Belgium
Benjamin Shaw	UK
Patrick Lazarus	Canada
Eleni Graikou	Greece
Kuo Liu	China
Antoine Lassus	France
Nicolas Caballero	Cyprus
Ismaël Cognard	France
Lucas Guillemot	France
Maximilian Imgrund	Germany
Lindley Lentati	UK
Antoine Petiteau	France
Andrea Possenti	Italy
Gilles Theureau	France

5. Conference Proceedings and Web page

Meeting Webpage: www.mpifr-bonn.mpg.de/staff/caball/EPTA_Spring_Meeting_2015.html

No proceedings were published for this meeting