



Getting more IPTA for your Buck

David Champion
Max-Planck-Institut für Radioastronomie
IPTA Conference, Kiama
29th June 2012



Getting more IPTA for your Buck *or* How I learned to stop worrying and love the IPTA

David Champion
Max-Planck-Institut für Radioastronomie
IPTA Conference, Kiama
29th June 2012



“If we don’t make the first pulsar GW detection with IPTA data then we’re doing something wrong”
Scott Ransom IPTA 2011



“I would love us all to stand in a circle,
hold hands and share the observing...
but it’s not going to happen”
Scott Ransom IPTA 2012

Working as the IPTA

- Data combination
 - We could make a detection if we “got lucky”
 - We will certainly find all the weirdness in each others data
 - Better understanding of our own datasets

Working as the IPTA

- Optimising observing strategy over the whole IPTA rather than by PTA
 - Clearly dependent on model of pulsar and GW
 - Optimise for detection or limit, single source or background
 - Pulsar triage? (examples from Matthew)
 - Within the current framework there is a potential gain of 10 years

Working as the IPTA

- Almost all PTA projects as IPTA
 - Working across 8 countries, 6 time zones
 - Committees, telecons etc are a necessary evil
- Implication is interdependence not only for GW work
- Massive change from competition to collaboration
 - Concern that a lack of competition will stifle progress
 - Concern from students needing protection

Public release of data

- Invite those outside the IPTA to search for GWs in our data
- Engage with the wider community
- Pulsar data is unusual:
 - “[The IPTA] is a very scary detector” Linqing
 - IPTA timing workshops
 - IPTA data challenges
 - Online simulator (KJ)
- Risk false alarms, gain novel techniques

IPTA common infrastructure

- Centralised database of fully / partially reduced data
- PD, RS: DM analysis and GW detection technique linked
- Access to raw uncalibrated data
- Common wiki and webpage

IPTA common hardware

- EPTA use common hardware: necessary for LEAP. Useful for comparison and combination.
- All our pulsars in one backend?
- Similar UBB frontends?
- Willem: Temporal variations in frontend / backend.
- Willem: In some cases MTM is better than x4 integration time

Detection / Limit Techniques

- At least 4 limit or detection techniques
- DN: “The ISM is a monster and we should be scared of it”
- DM keep Matthew awake at night
- Linqing: Keep the non-optimal techniques
- Different biases and assumptions
- When a detection is made it would be reassuring to see it in more than one technique

Beyond GWs

- Is the IPTA only for GWs?
- Many of our current projects are not purely GW based.
 - Clock corrections (George's talk)
 - Solar wind (Xiaopeng's talk)
 - ISM effects (e.g. Dan's talk)
 - Pulsar navigation (Jiang's talk)
 - Solar System
- “Our secondary science is more interesting than most groups’ primary science”

Expanding the IPTA

- FAST - can we expect a CPTA?
- Proposals as the IPTA?
 - MeerKAT
 - SKA

The Bucks

- “The IPTA is like Star Trek, it started out as a 5 year mission, but it keeps coming back” Mike
- “We use large amounts of expensive telescope time” Simon
- Matthew: 300M\$ project
- “Let the TACs do their job”

Global funding

- E.g. PIRE grant for NanoGRAV
- Resources:
 - IPTA white paper
 - Sources:
 - NanoGrav
 - SKA white papers
 - More...

IPTA and the SKA

- RNM: Even 20% SKA will be a big improvement
- Scott: “SKA phase 1 is not a panacea for pulsars”
- PSR GW is a major science driver
- “If we are going to drive the SKA [for PSR GW] we’d better be sure that we can do it” Jim
- “If we were to design a PSR GW telescope, it wouldn’t be the SKA” Simon
- Won’t see all northern sky

“The future of the IPTA is bright!”
IPTA students 2012

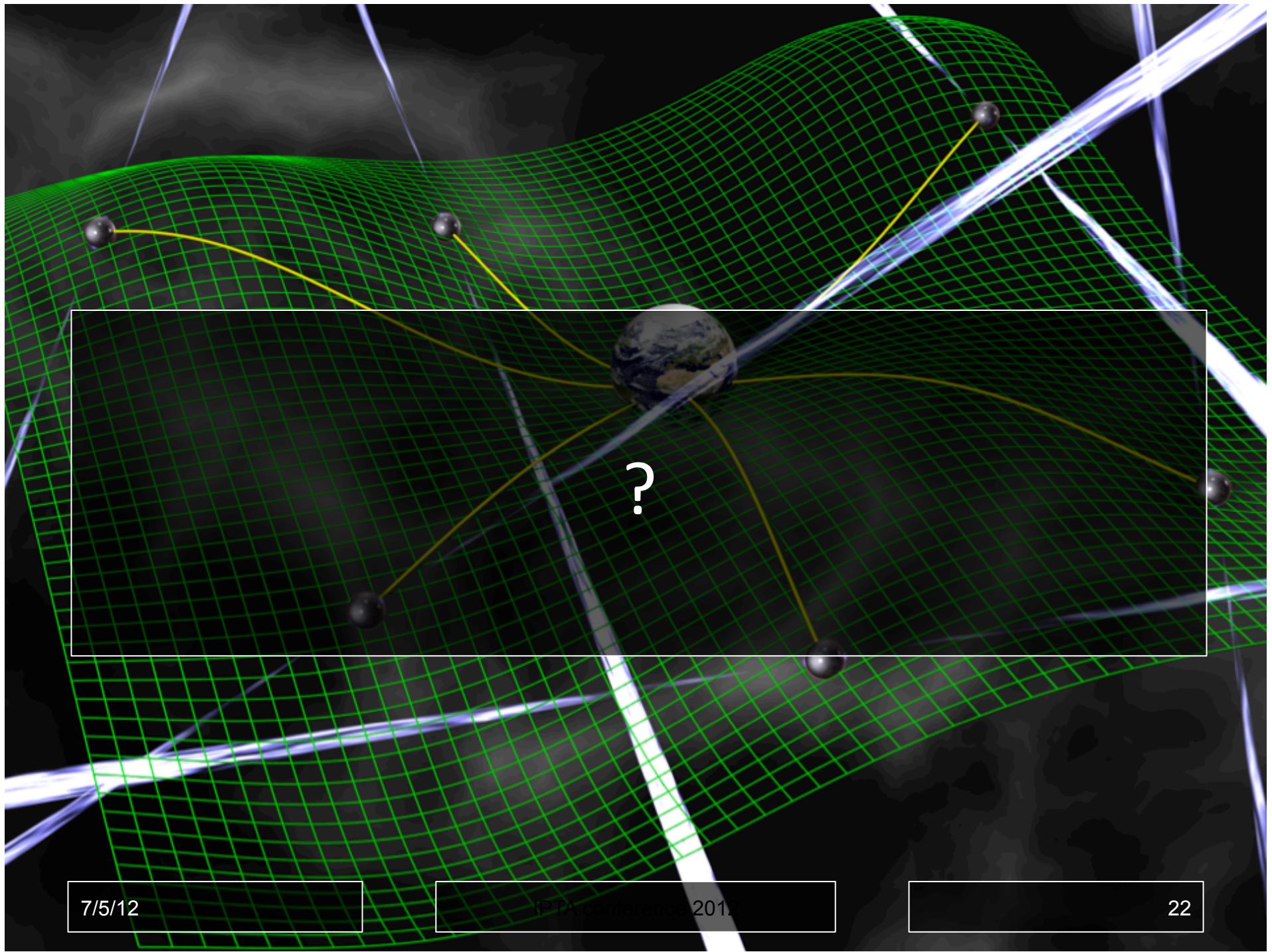
Discussion Topics

- What other opportunities exist within the IPTA related areas that we can use for outreach, do we need to make it part of the IPTA structure to have an outreach group?
- New telescopes: FAST, LEAP, MeerKAT, ASKAP
- Are the frequency ranges enough? Sub-arrays?
- RNM: If LEAP gets really good TOAs at 21cm then the other telescope can concentrate on the other bands
- Is Joris completely stupid? Can we use LOFAR to correct DM?
- Variability of scattering could help LOFAR
- Checking the SKA hardware / software
- Is the SKA the solution?
- Jitter issues – can we correct for it? Is it a problem?
- GMRT at low frequencies
- SKA: Big science model

Notes from talks

- MB: LIGO syndrome
- DN: ISM is a monster and we should be scared of it
- DN: still engineering the detector

- - common instruments
- - repositories
- - public data
- - moving beyond GWs
- - global funding
- - the IPTA and the SKA



7/5/12

IPTA conference 2012

22