S3 and S4 pulsars injections

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For
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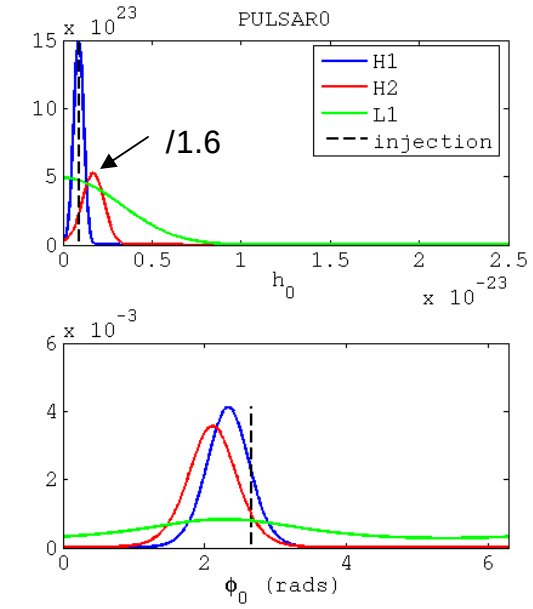
LIGO-G050453-00-Z

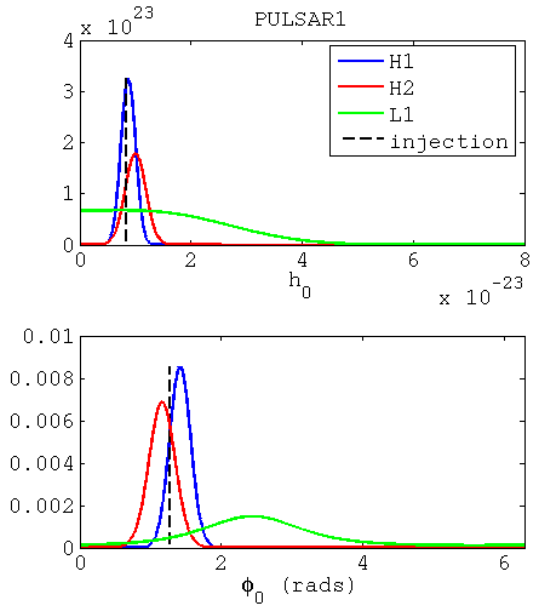
S3 injections

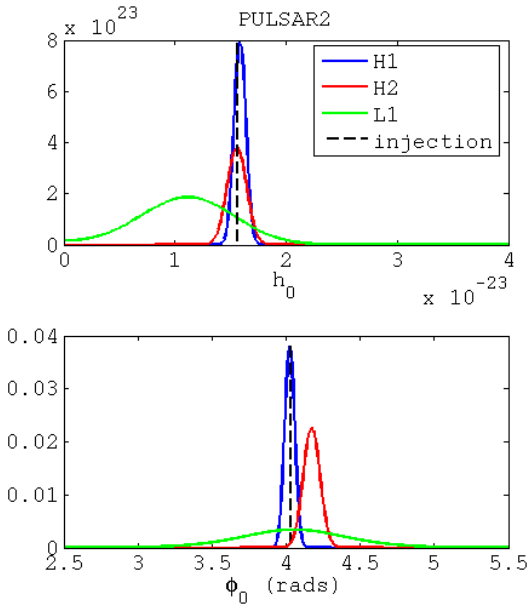
- Posterior pdfs for h_0 and ϕ_0, hardwiring the other parameters to their injection values
- Amplitudes corrected to take account of the difference between the calibration used to calculate the injection strength (E10), and the calibration used to recover the signal (S3 v3)
- Phases post-corrected for the fact that we added the actuation phase correction to the injections with the wrong sign

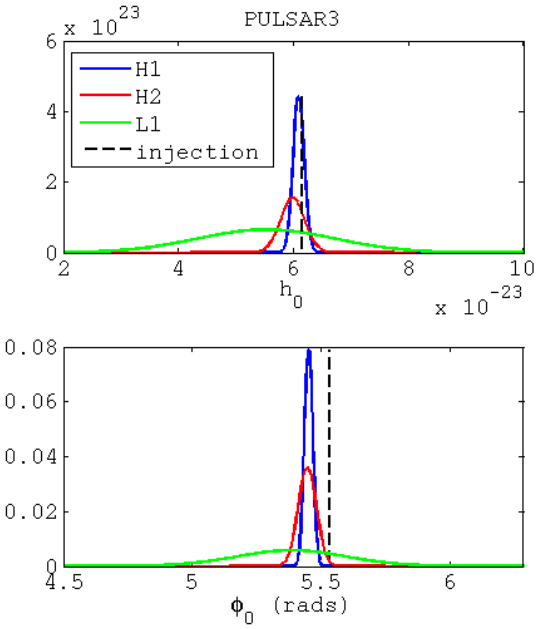
PULSAR	α	δ	$\nu_{\rm gw}$ (Hz)	$\dot{\nu}_{\rm gw}$ (Hz/s)	h_0	ϕ_0	ι	ψ
0	1.25	-0.98	265.5	-4.15×10^{-12}	9.38×10^{-25}	2.66	0.65	0.77
1	0.65	-0.51	849.1	-3.00×10^{-10}	8.49×10^{-24}	1.28	1.09	0.36
2	3.76	0.06	575.2	-1.37×10^{-13}	1.56×10^{-23}	4.03	2.76	-0.22
3	3.11	-0.58	108.9	-1.46×10^{-17}	6.16×10^{-23}	5.53	1.65	0.44
4	4.89	-0.21	1430.2	-2.54×10^{-8}	1.01×10^{-21}	4.83	1.29	-0.65
5	5.28	-1.46	52.8	-4.03×10^{-18}	1.83×10^{-23}	2.23	1.09	-0.36
6	6.26	-1.14	148.7	-6.73×10^{-9}	5.24×10^{-24}	0.97	1.73	0.47
7	3.90	-0.36	1221.0	-1.12×10^{-9}	2.81×10^{-23}	5.24	0.71	0.51
8	6.13	-0.58	194.3	-8.65×10^{-9}	6.02×10^{-23}	5.89	1.50	0.17
9	3.47	1.32	763.8	-1.45×10^{-17}	1.61×10^{-22}	1.01	2.23	-0.01
GEO	0.78	-0.62	1125.6	-2.87×10^{-11}	7.5×10^{-22}	1.99	0.84	0.37

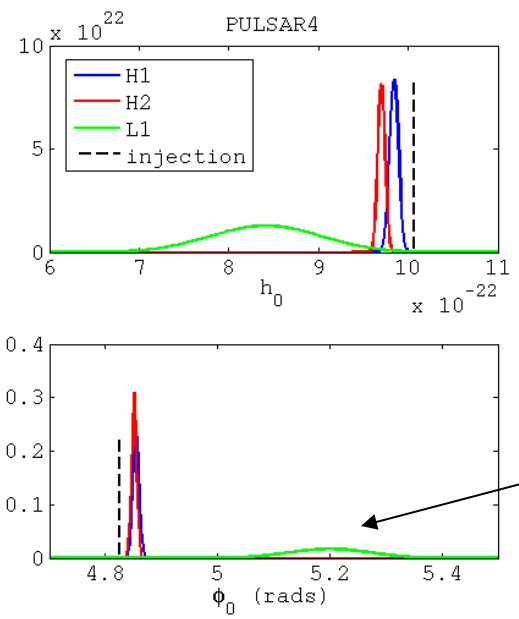
S3 injections recovered (public pulsars)







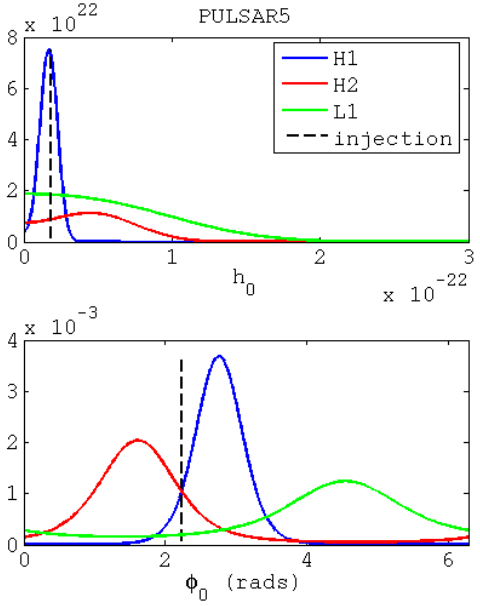


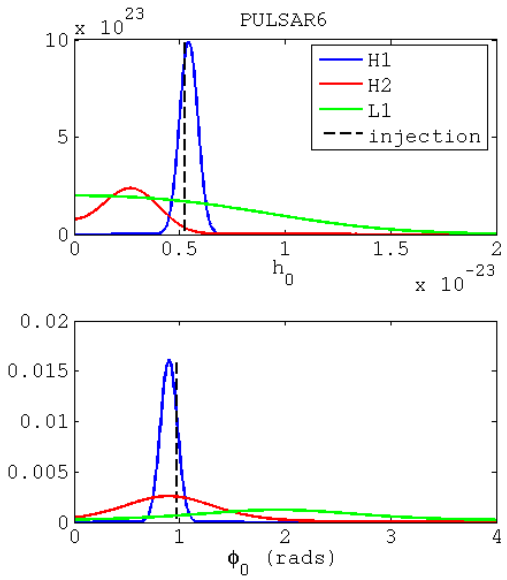


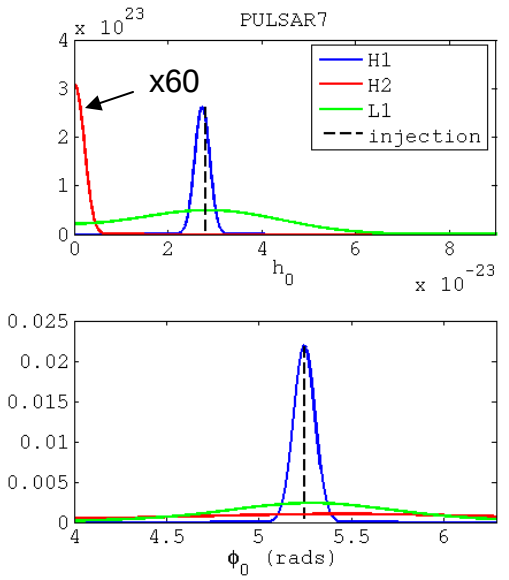
- P0 injected into H2 with 1.6x the correct amplitude

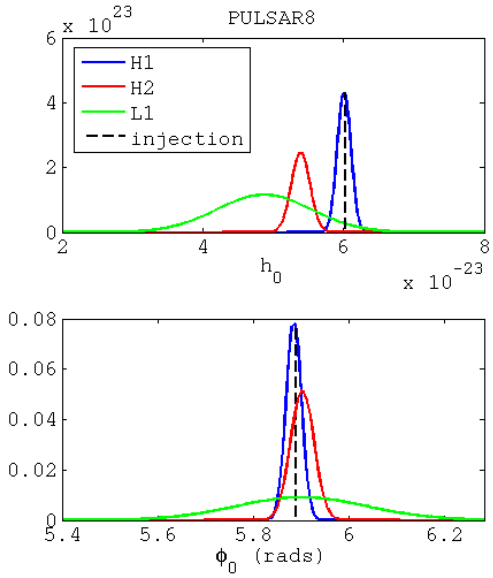
calibration problem?

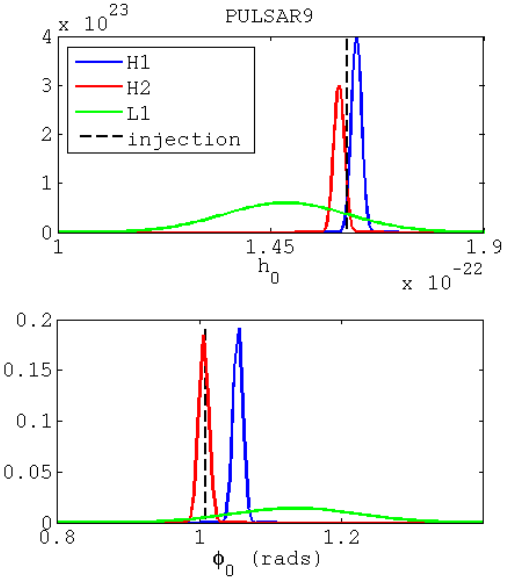
S3 injections recovered (private pulsars)











- P7 injected into H2 with 1/60th the correct amplitude

S4 injections

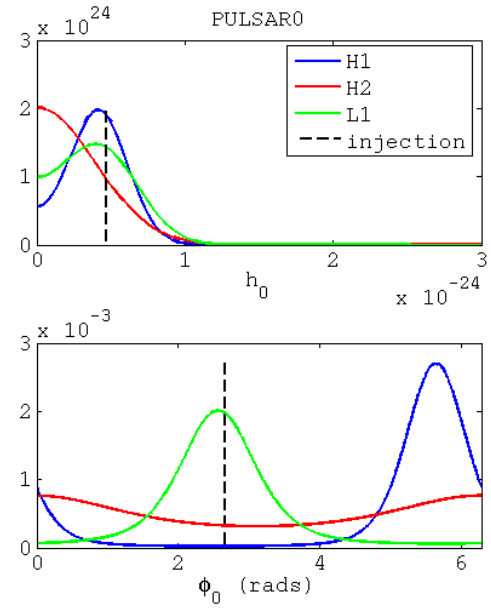
- Posterior pdfs for h_0 and $\phi_{0,}$ hardwiring the other parameters to their injection values.

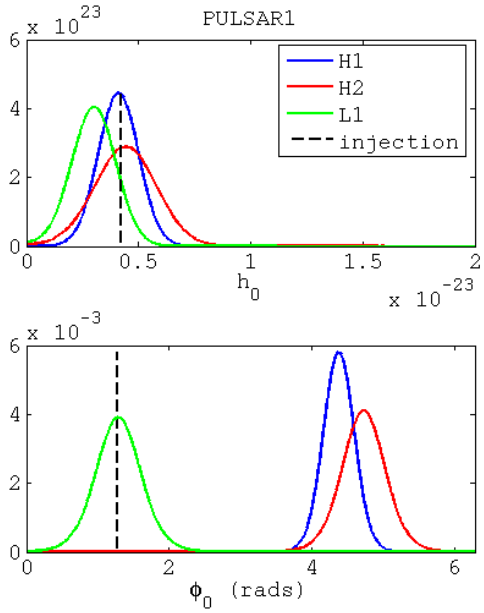
- S4 v3 calibration. NO amplitude correction, but differences between injection and recovery calibration is small.

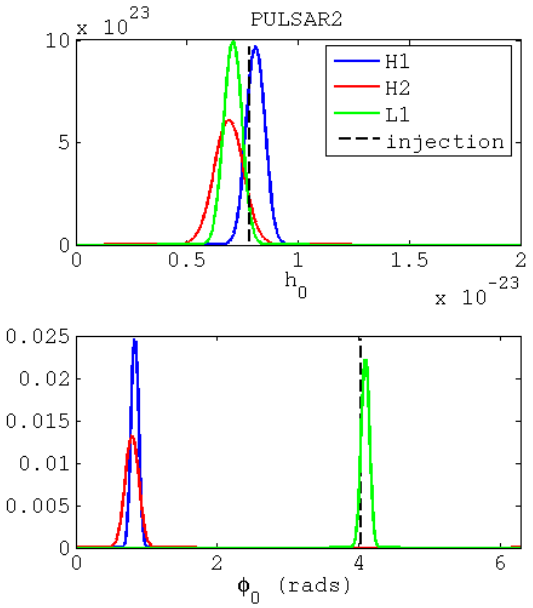
PULSAR	0	1	2	3	4
h_0	4.69×10^{-25}	4.25×10^{-24}	7.81×10^{-24}	3.08×10^{-23}	5.03×10^{-22}
PULSAR	5	6	7	8	9
h_0	9.17×10^{-24}	2.62×10^{-24}	1.40×10^{-23}	3.01×10^{-23}	8.06×10^{-24}

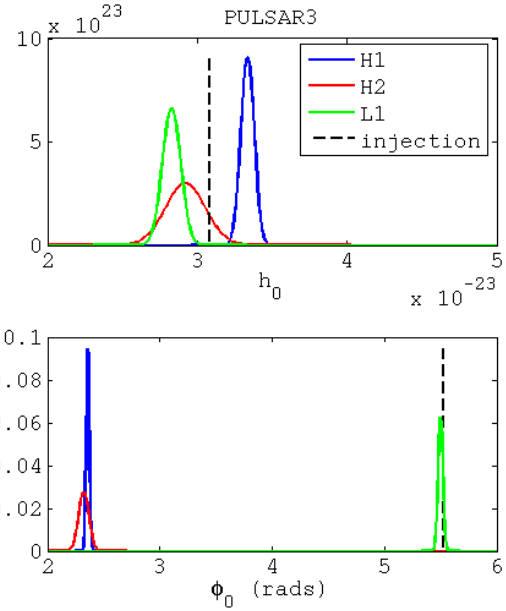
PULSAR	$\nu_{\rm gw}$ (Hz)	h_0	T_0 (MJD in GPS)	P_b (days)
10	250.6	1.23×10^{-22}	51749.71156482407	1.35405939
11	188.0	4.93×10^{-22}	52812.92041175901	0.31963390
	e	ω_0 (degs)	$a\sin i$ (secs)	
10	0.0	0.0	1.65284	
11	0.180567	322.571	2.7564	

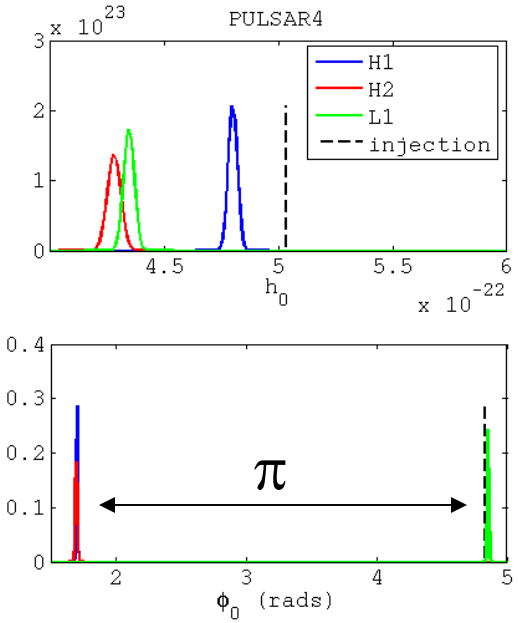
S4 injections recovered (public pulsars)





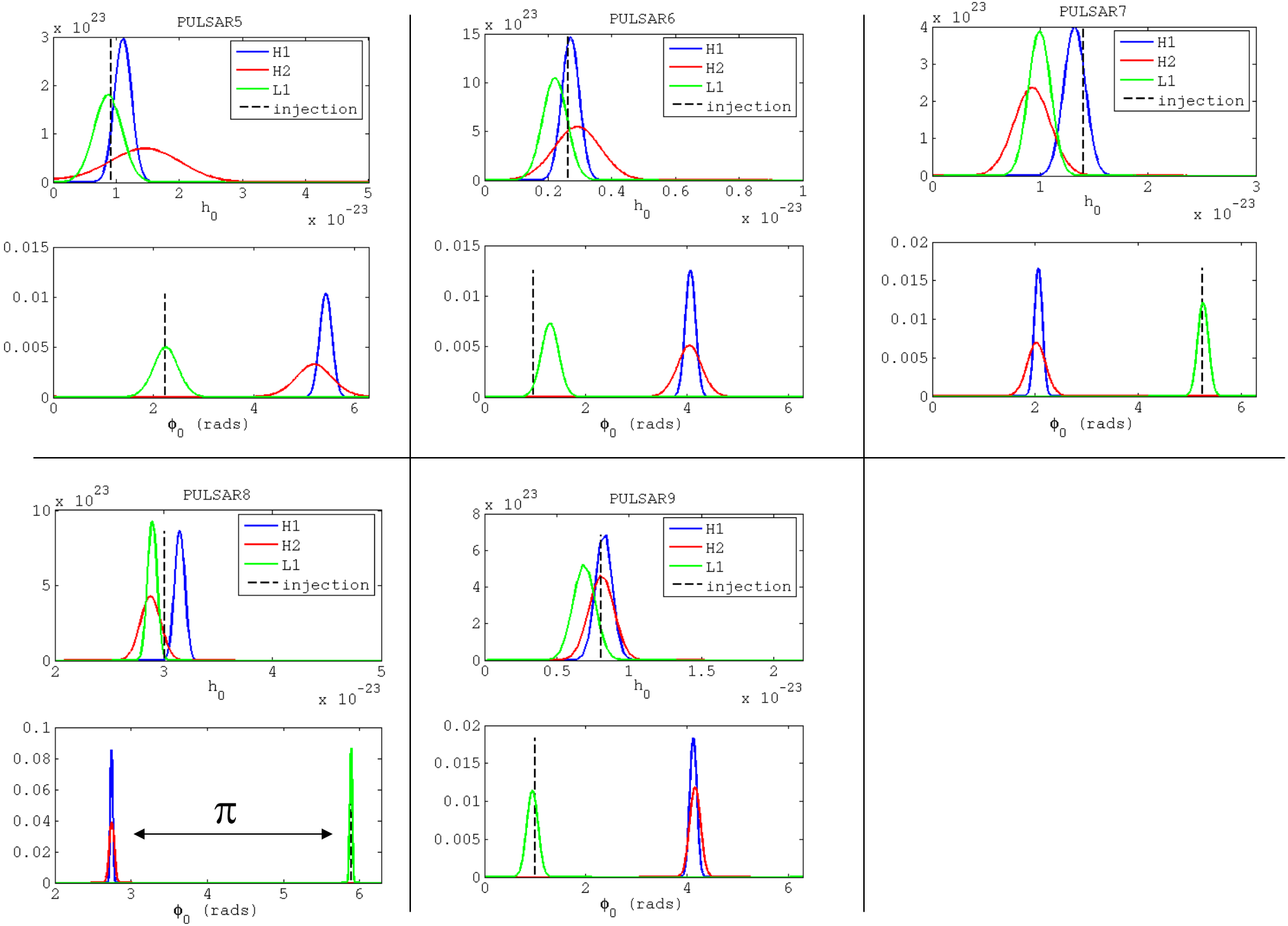




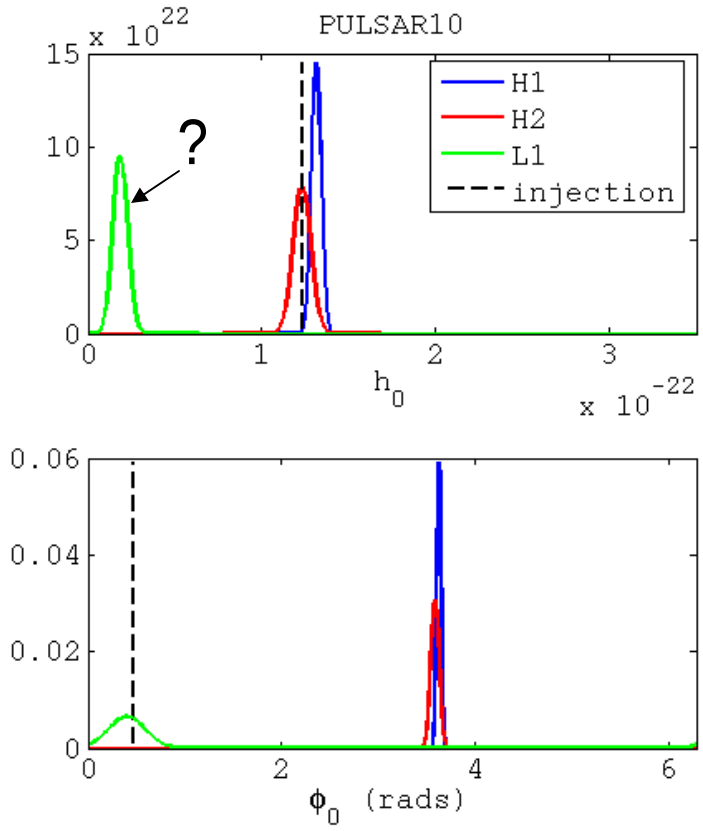


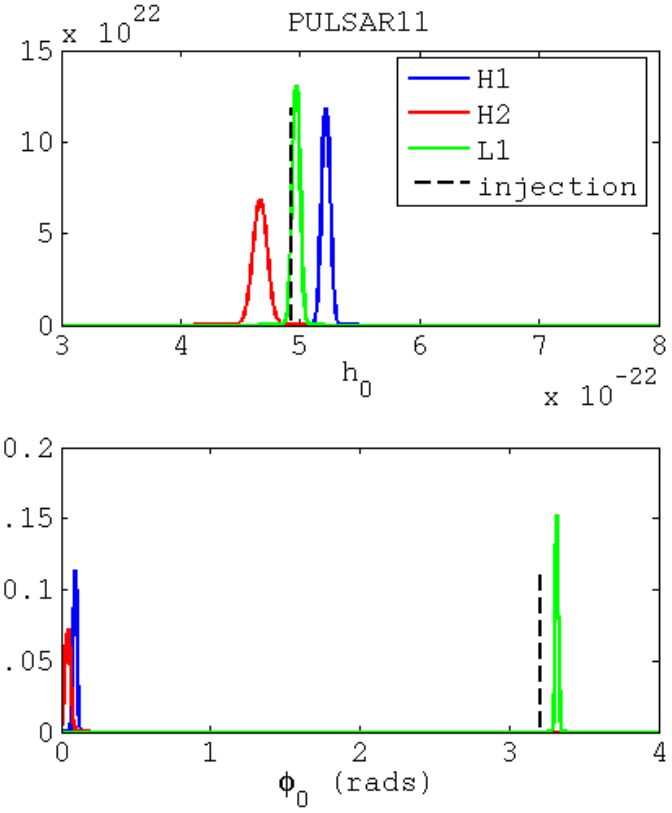
- No corrections for actuation calibration
- Sign inconsistency between LHO and LLO

S4 injections recovered (private pulsars)



S4 injections recovered (binary pulsars)





- P10 amplitude in L1 is ~4 times lower than in H1/H2, though the injection parameter files appear to be OK.
- same sign flip seen in the isolated injections.

Bottom line

- S3 injections are now understood and are consistent over the IFOs

- S4 injections are mostly understood, but:
  - P10 is seen too weakly in L1 by ~ factor 4
  - There is a sign flip (or phase lag v. close to pi) between LHO and LLO, with L1 showing the expected sign/phase

- Is the sign problem with the calibration (bad news) or the injection (less bad news)?