



PULSE@Parkes Challenges

The following table lists a set of challenges that could be met by students. Several are straightforward whilst others are more challenging. The PULSE@Parkes team welcome any submissions from students or teams that complete any of these challenges or other projects using PULSE@Parkes data.

Project	Description	Skills required	Result
What do the profiles look like?	Construct a poster (or similar) showing the pulse profile for each pulsar presented in a clear and artistic manner	Graphics design/ Powerpoint	A poster
How do the profiles change as a function of distance?	Construct a poster (or similar) showing the pulse profiles with the closest pulsars first and the furthest away pulsars last	Graphics design/ Powerpoint	A poster
How do the profiles change as a function of various parameters?	Develop a webpage that displays the pulse profiles in an order chosen by the user. The choice could be based on pulse period, distance, age or magnetic field strength	webpage design/web coding (such as php)	A webpage
What does space look like around each pulsar?	Produce a document, poster or webpage that shows the sky in different wavebands (optical, X-ray, infrared) around the positions of each pulsar in the PULSE@Parkes sample	use of online astronomy software	Webpage or document
Create a Stellarium add-on	Develop an add-on to various planetarium packages (such as <i>Stellarium</i> , but it could also be from other packages) showing the positions of the PULSE@Parkes pulsars	Use of astronomy software	Development of planetarium package of choice
Animation of pulsar rotation	Visualising a pulsar rotating and producing its emitting beam is difficult and could be aided by a simple animation of a pulsar.	3D animation software	Pulsar animation

Pulsar sound files	The pulsar signal can be represented as a sound file. We would like some software that takes in a pulse shape and produces such a sound file	Software development	.wav files based on pulsar profiles.
Automatic determination of whether a pulsar is “on” or “off”	Pulsars sometimes switch on or off. We’d like some software that compares all available observations of a pulsar to determine in which observations it is “on” and in which observations it is “off”.	Software development	Software package to determine “on” and “off” states.
Mathematical modeling of the pulse shapes	Pulsars have complex shapes and they are also affected by noise. We’d like a simple analytical (mathematical) description of each of the pulse shapes.	Mathematics	Simple analytic model of the pulse shapes
Pulsar explanation	Pulsars are complicated. Write a document that can easily be understood by high-school explaining what pulsars are and what you can do with them.	Writing	Document
Pulsars and black holes	Black holes are exciting and finding a pulsar orbiting a black hole is one of the main goals of pulsar astronomy. Write a document, written for high-school students, that explains the importance of such a result.	Writing	Document
Translation of PULSE@Parkes pages	Our webpages are written in English. However, we are now carrying out PULSE@Parkes sessions overseas and particular wish to have some webpages translated into Chinese and/or Japanese.	Translation and writing skills	Translation of webpages
The pulsars	Write a description of each of the PULSE@Parkes pulsars giving their properties and explaining why they are interesting.	Use of astronomy catalogues	Document