# 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.

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| 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 *Stellarium*, 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 |