Abstract: We propose a model to explain the X-ray and soft gamma-ray spectra and light curves of a class of young pulsars: PSR B1509-58, PSR J1846-0258, PSR J1811-1925, PSR J1617-5055 and PSR J1930+1852.

Simulation Result:

![Image of simulation result](https://example.com/simulation.png)

**Simulation Method:**

1. Trace the field lines and calculate the direction of the curvature radiation, $\mathbf{r}_{\text{cur}}$, at each step $\mathbf{r}$.
2. Trace $\mathbf{r}_{\text{cur}}$ of the incoming curvature radiation to find the place, $\mathbf{r}$, where the pair creation happens.
3. Calculate the pulse phases and viewing angles, $(\phi, \psi)$, along the hollow cone at $\mathbf{r}$.
4. Calculate the spectrum of the radiation that satisfies $|\mathbf{r}| - |\mathbf{r}_{\text{cur}}| < 0.5 \mathbf{r}$, where $\mathbf{r}$ is the viewing angle.
5. Trace the direction of synchrotron radiation to calculate the attenuation of the radiation caused by the pair creation, and remove the photons that covered by the star.
6. Integrate the phase resolved spectra to obtain the energy dependent light curves.

**Pulse Phase of the Synchrotron Radiation:**

The pulse phase and viewing angle of the synchrotron radiation may be much different with the original curvature radiation. In the skymap, the highly beamed curvature radiation is represented by a point, the hollow cone with a small pitch angle is represented by a circle surrounding the polar cap, and the hollow cone with a large pitch angle is represented by a line that goes across the sky.

**Conclusion:**

The lines of sight of these five pulsars are in the directions of incoming beams instead of outgoing beams, otherwise a characteristic power law with exponential cut-off spectrum with cut-off energy around a few GeV should be observed. The observed spectrum is the synchrotron radiation emitted by the particles produced by the magnetic field that converts the major part of the incoming curvature photons.

**References:**

Küiper, L. & Hernanz, E. 2013, in preparation
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**Where are the GeV curvature photons?**

The outgoing GeV curvature photons are missed by the viewing angle. If the viewing angle or inclination angle increases, the GeV curvature photons can be seen.

**Why is the cut-off energy of the spectrum so low?**

This is because of the attenuation of the synchrotron photons caused by the magnetic pair creation.

**How to constraint the inclination and viewing angles?**

1. The “ring” in the SNR if the ring is circular, the viewing angle can be determined directly.
2. The energy of the peak of the spectrum Different inclination angles and viewing angles lead to different energies of the peak of the spectrum due to different optical depths of the magnetic pair creation.
3. The shape of the light curve
4. The phase lag of the peak of the X-ray radiation to the radio radiation