



**Searching for the fastest spinning
single white dwarfs with *Tomo-e Gozen***

Kojiro Kawana (U. Tokyo)

2019/07/09

Kiso-Schmidt Symposium

fast spinning single WDs (fssWDs)

- We consider WDs spinning with periods of $P \lesssim 10$ min
- In standard (single star) evolution scenarios, such fast spinning WDs are not formed.
- WDs can spin-up via accretion from companion star.
 - In binary systems (e.g. cataclysmic variables, X-ray binaries), fast spinning WDs have been found.
- Are there fast spinning **single** WDs?

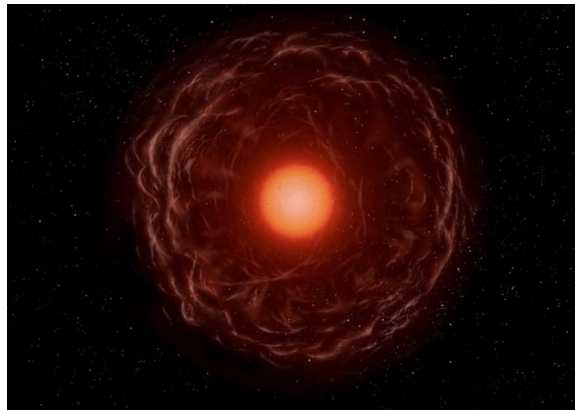
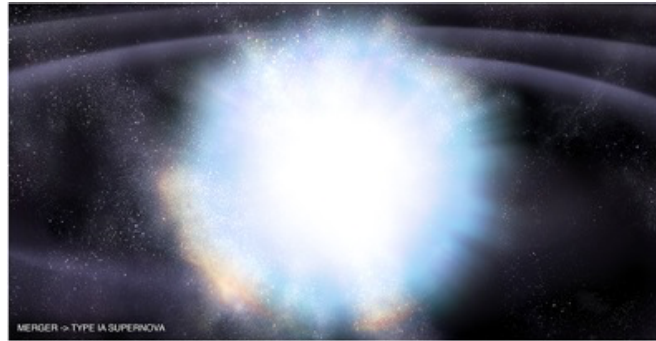
Q. How to form fssWDs?

A. Double WDs mergers

Double WD merger



Ia SNe



Debris expansion



cooling -> massive WD

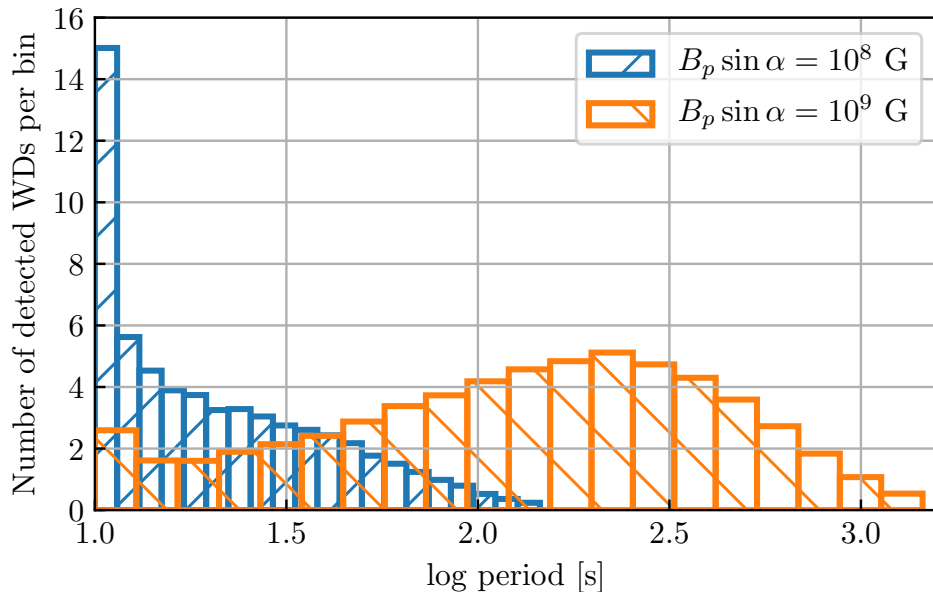
We can naively expect fast spin \sim a few sec (\approx mass shedding limit)

Motivations to find fssWDs :

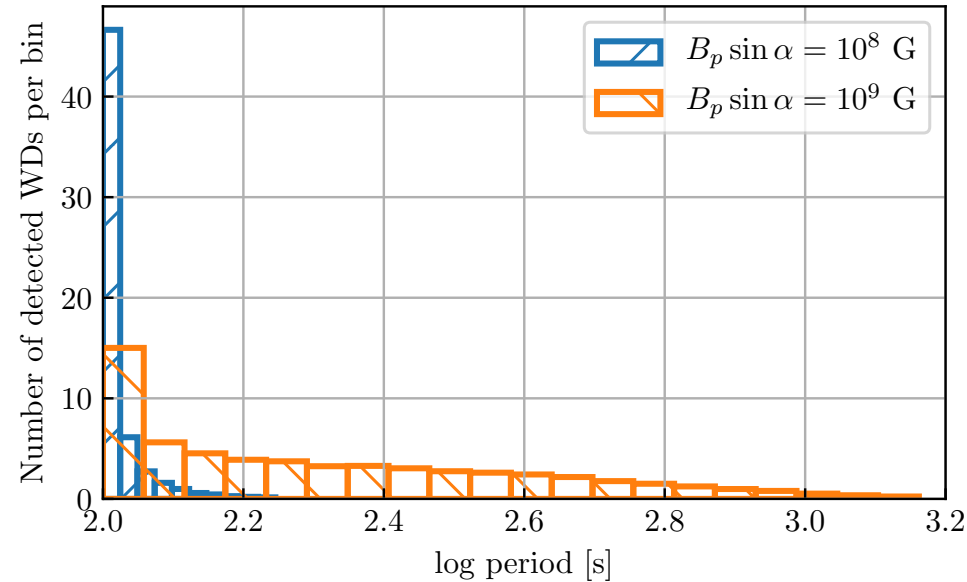
- Fates of double degenerate WD mergers Shwab (2018)
- $e^- e^+$ cosmic ray factories Kashiyama, Ioka, & Kawanaka (2011)
- Fast Radio Bursts (FRBs) Kashiyama, Ioka, & Mészáros (2013)
- Structure of rotating magnetic WD see Kashiyama's talk

Prospects of fssWDs survey with Tomo-e

1. $P_0 = 10$ sec or $v_{\text{rot},0} \simeq 0.3 v_{\text{shed}}$



2. $P_0 = 100$ sec or $v_{\text{rot},0} \simeq 0.03 v_{\text{shed}}$



Totally ~ 60 fssWDs would be detected with *Tomo-e Gozen*