UPPER LIMITS ON GAMMA-RAY EMISSION FROM SUPERNOVAE SERENDIPITOUSLY OBSERVED WITH H.E.S.S.

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Are SNe PeV CR accelerators?

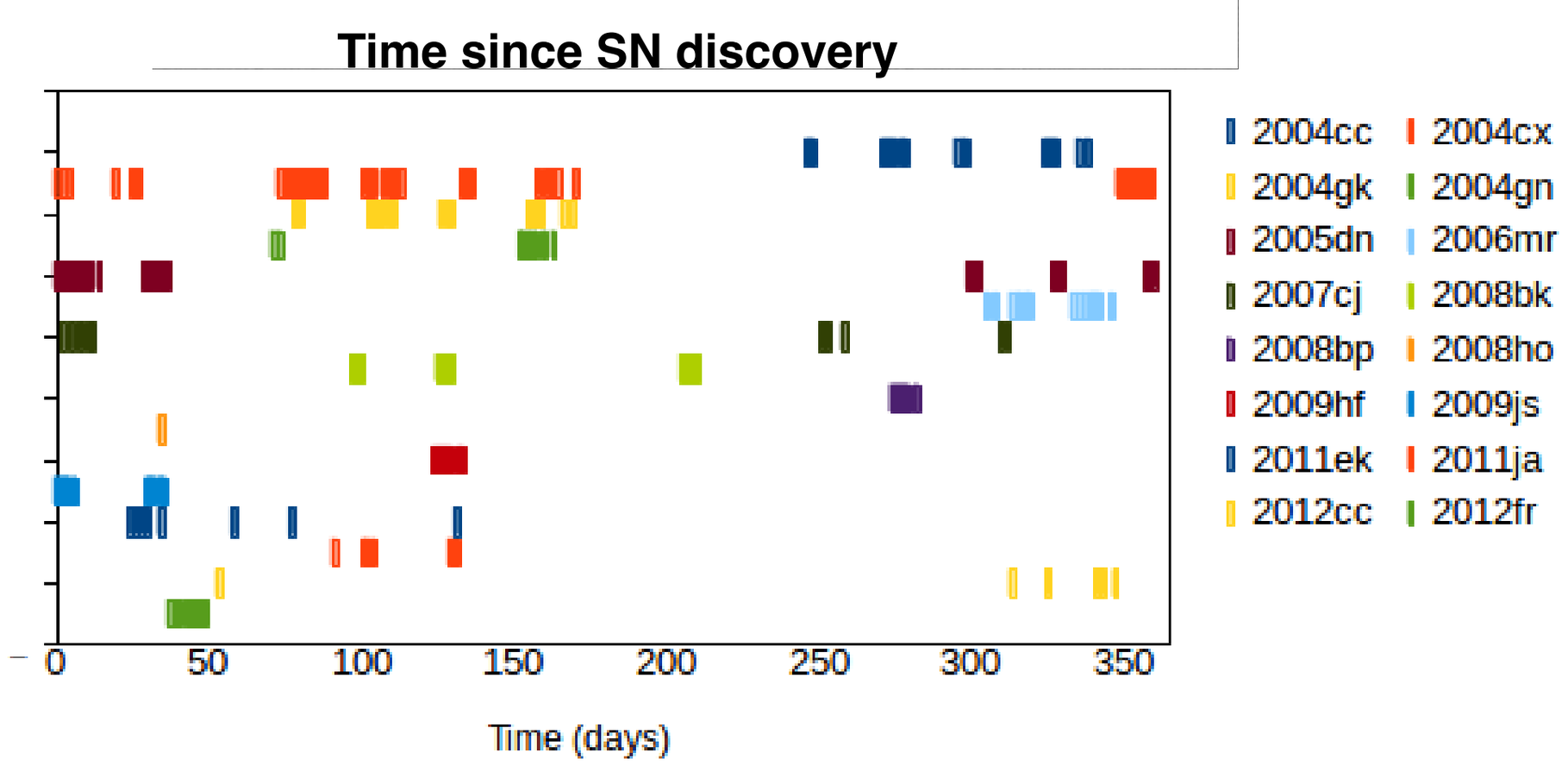
Recent theoretical models are predicting PeV CRs emission from young SNe in a very dense environment :

Marcowith et al. 2014, Cardillo et al 2015, Murase et al 2011, Katz et al 2011.

In that perspective, we looked in our data (December 2003 to March 2015) to see if CC SNe have been observed by chance, in the FoV of H.E.S.S. XGal observations. A final sample of 9 type II SNe were selected.

Candidate Selection :

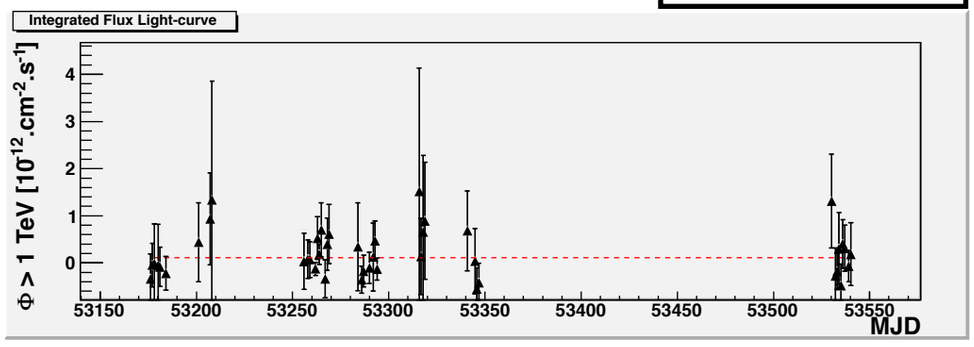
- host galaxies with $z<0.01$
- observation 1 wk before or within the year after the SNe explosion.
- Type Ia and type Ic were put appart from the sample



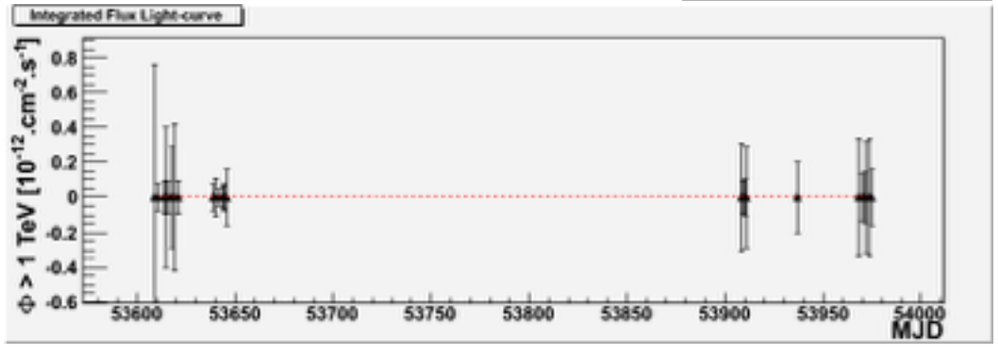
No Detection

Light curves

SN2004cx



SN2005dn



Upper Limits

SNe	Host Galaxy	Distance (Mpc)	type	**Upper Limit(95%) on Flux above 1 TeV (10^{-13} cm^{-2} s^{-1})**
SN2004cx	NGC 7755	26 ± 5	type II	**1.9**
SN2005dn	NGC 6861	38.4 ± 2.7	type ?	**0.41**
SN2008bk	NGC 7793	4.0 ± 0.4	type IIP	**4.8**
SN2008ho	NGC 922	41.5 ± 2.9	type IIP	**7.7**
SN2008bp	NGC 3095	29 ± 6	type IIP	**5.5**
SN2009js	NGC 918	16 ± 3	type IIP?	**11**
SN2009hf	NGC 175	53.9 ± 3.8	type IIP	**5.3**
SN2011ja	NGC 4945	5.28 ±0.38	type IIP	**3.9**
SN2012cc	NGC 4419	~20	type II	**10**

Conclusion

- We see no VHE gamma-ray emission from none of these objects and can provide ULs on their TeV emission.

- This archival study is adding some new SNe to the list of “non gamma-ray” emitters and complete former studies (Lennarz 2013, Fermi-LAT 2015).

- This non detection raises a lot of questions that we have to investigate further in regard of the theoretical models :

  - Are the CSM not dense enough for all of these type IIp?

  - gamma-gamma suppression need to be investigated as this could be important as predicted for 1993J (Marcowith and al. 2014).

Linked with this study :

H.E.S.S. triggered some observations on SN2016 adj, that occurred in CenA on the 8th February 2016 : analysis is going on.