

Timau telescope for extra-galactic transient science?

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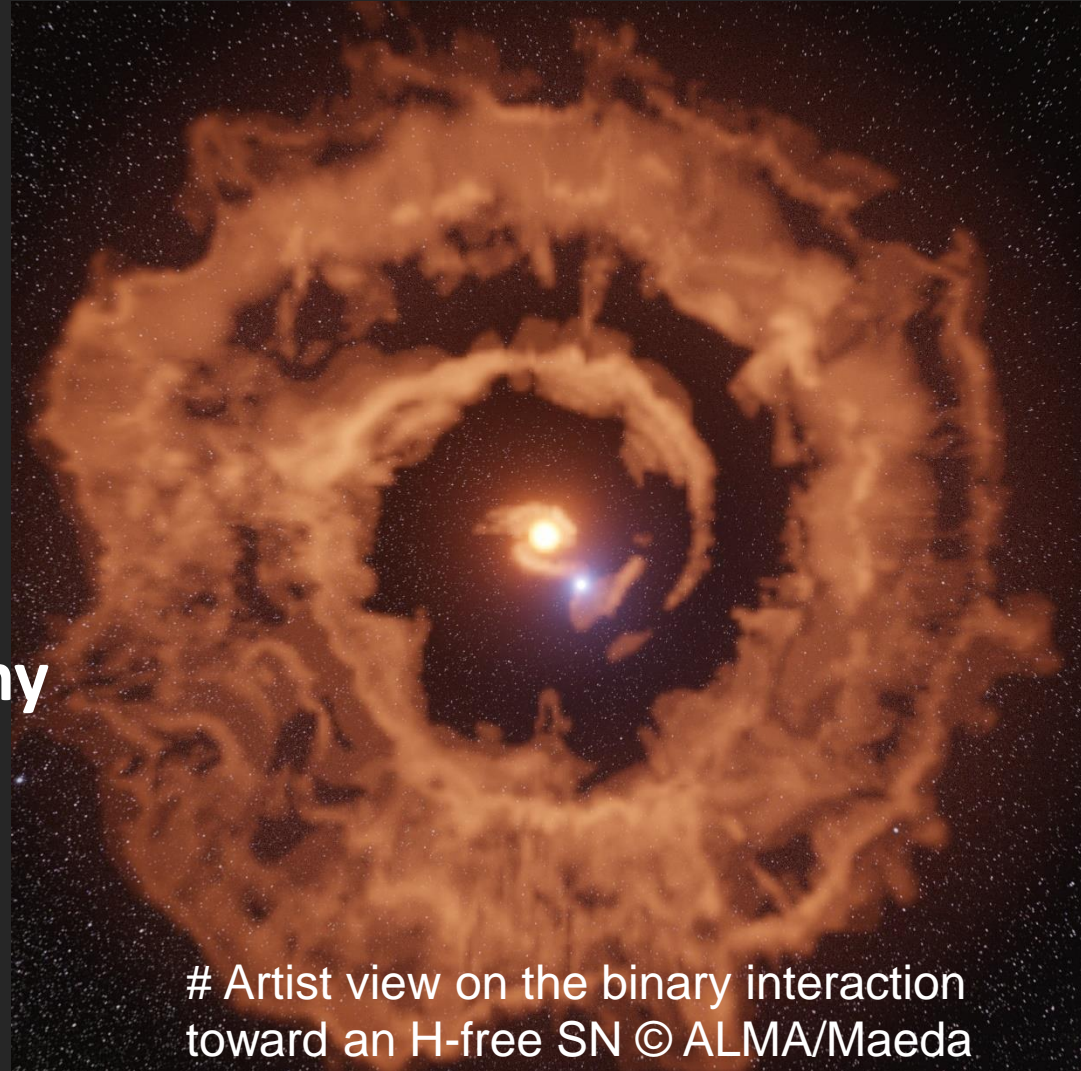
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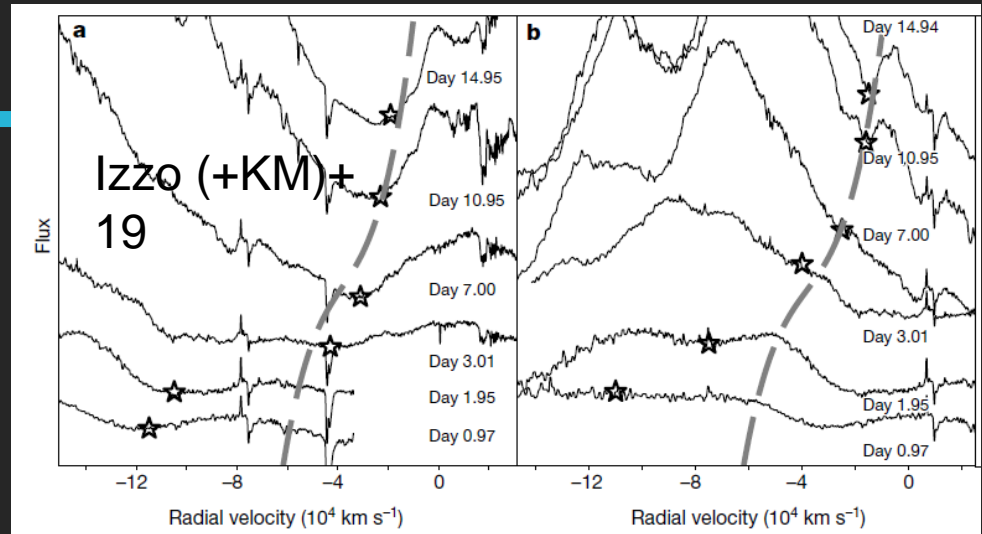
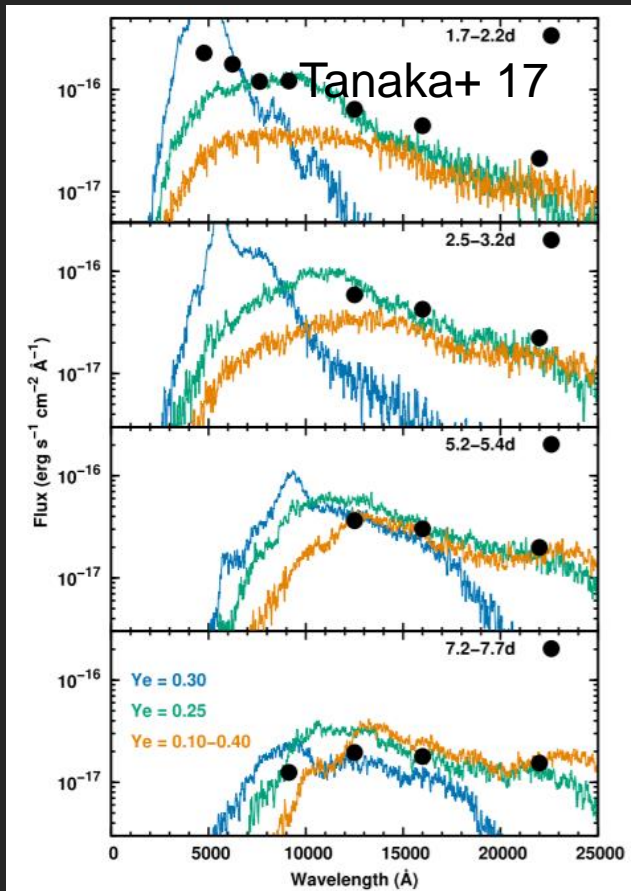
“Seimei UM 2024”,

Kurashiki, 2024.9.9-10 (online talk)

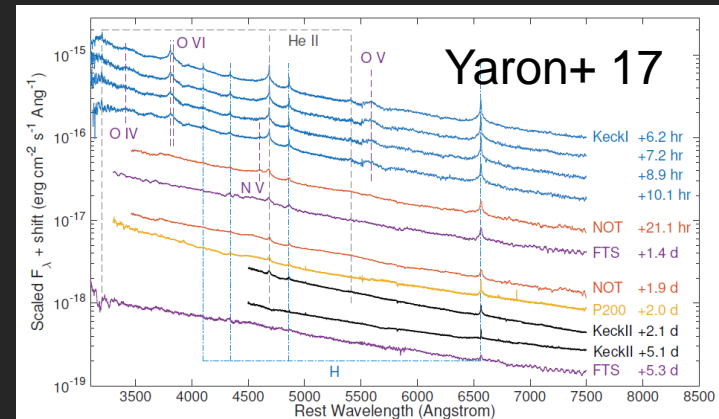


Artist view on the binary interaction
toward an H-free SN © ALMA/Maeda

Key in transient science: rapid follow-up (just a few examples)



Gamma-ray bursts (w/ SNe)

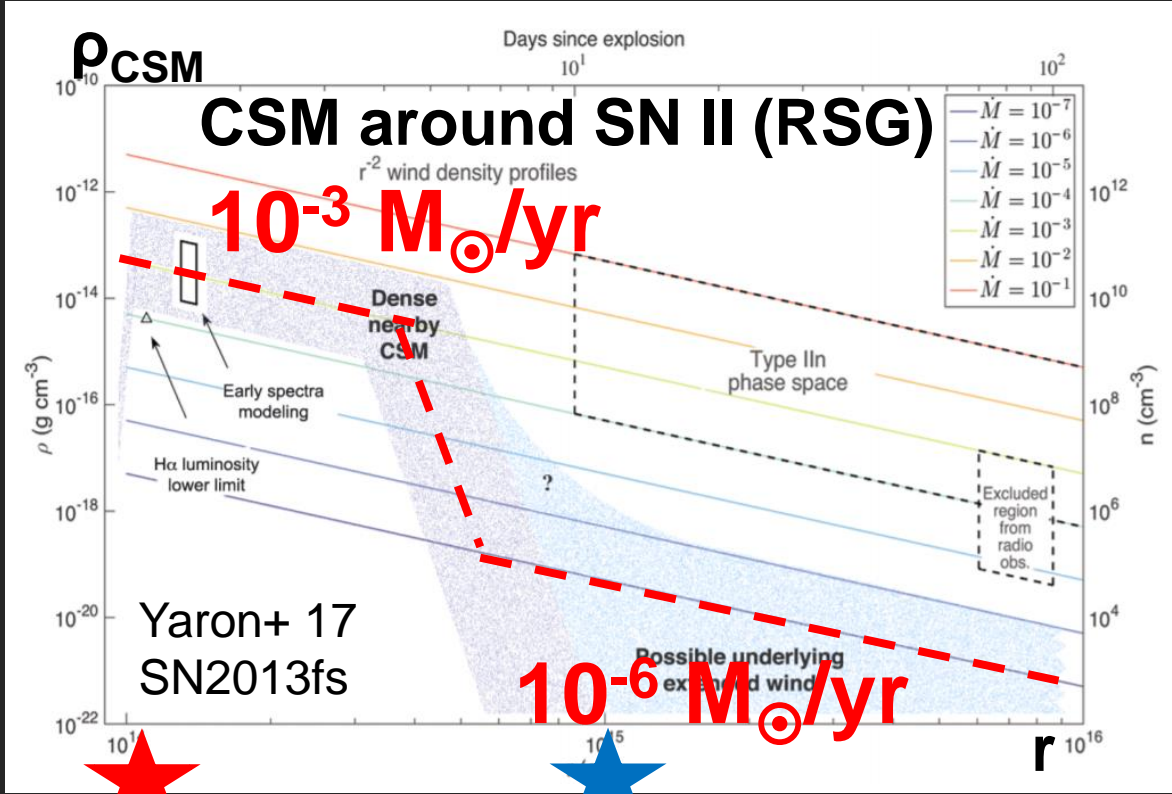


Gravitational wave counterparts

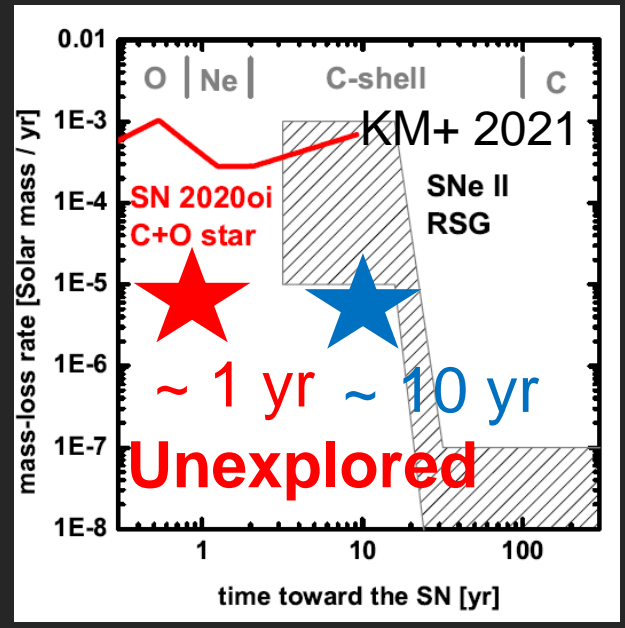
Supernovae (SNe)

As rapid as possible after the candidate discovery.
Spectroscopy more than important (\Rightarrow Jian's talk).

Example: CSM just around SN progenitors



Mass-loss history



~ 1 day

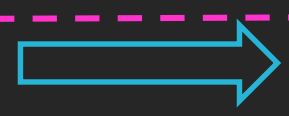
~ 10 day

10^{15} cm

Information on CSM

$\rightarrow @10^{14}$ cm

$\rightarrow @10^{15}$ cm

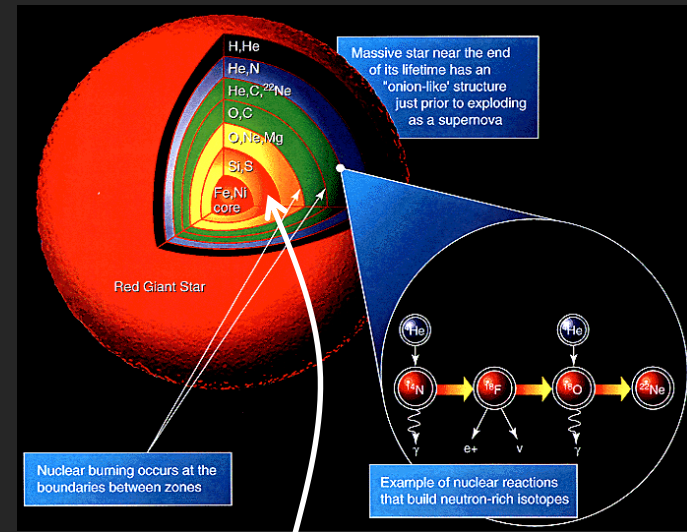


Shock wave

Discovery space example: "Si/S-rich CSM"

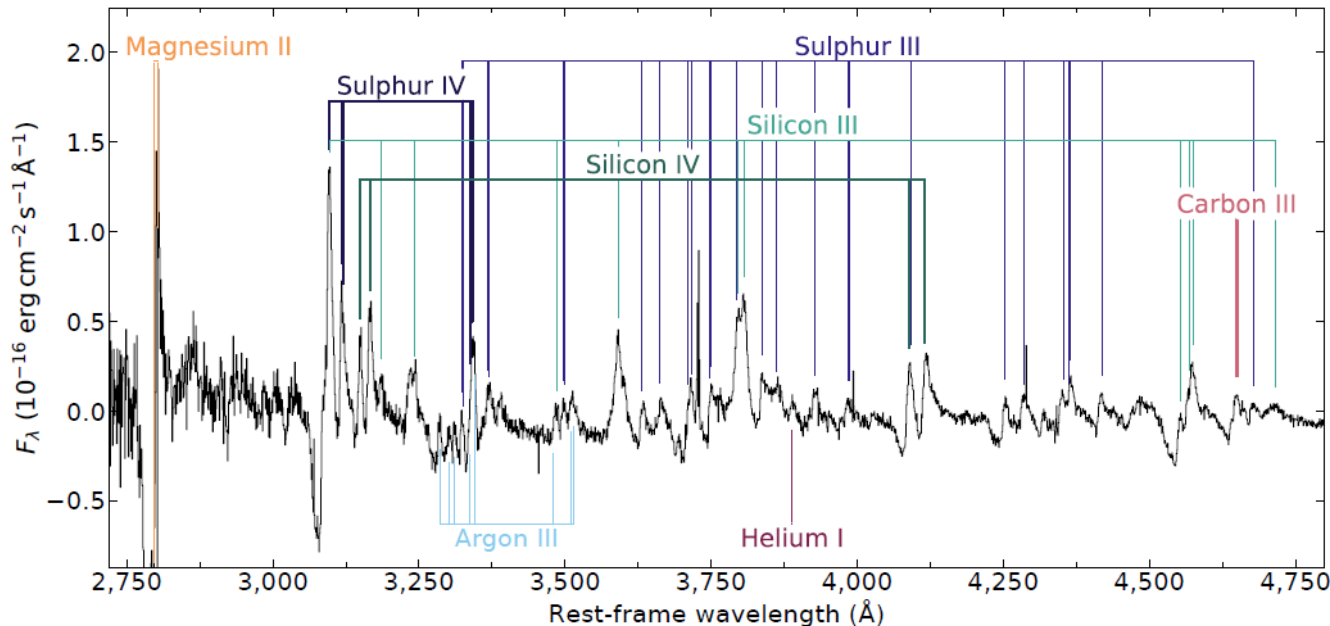
Gal-Yam 2017, "prediction"

Ejecta composition	CSM composition	SN Type	SN Type[27]
H	H	SN IIn	SN 0 i0
He	He, (H)	SN Ibn	SN 1 i1
C/O	C/O	SN Icn	SN 2 i2
O/Ne/Mg	O/Ne/Mg	SN Idn	SN 3 i3
O/Si/S	O/Si/S	SN Ien	SN 4 i4



Si and S produced only in the last < 1000 yrs in the innermost region.

Schulze (+KM) +, 2024, arXiv: 2409.02054, "discovery"

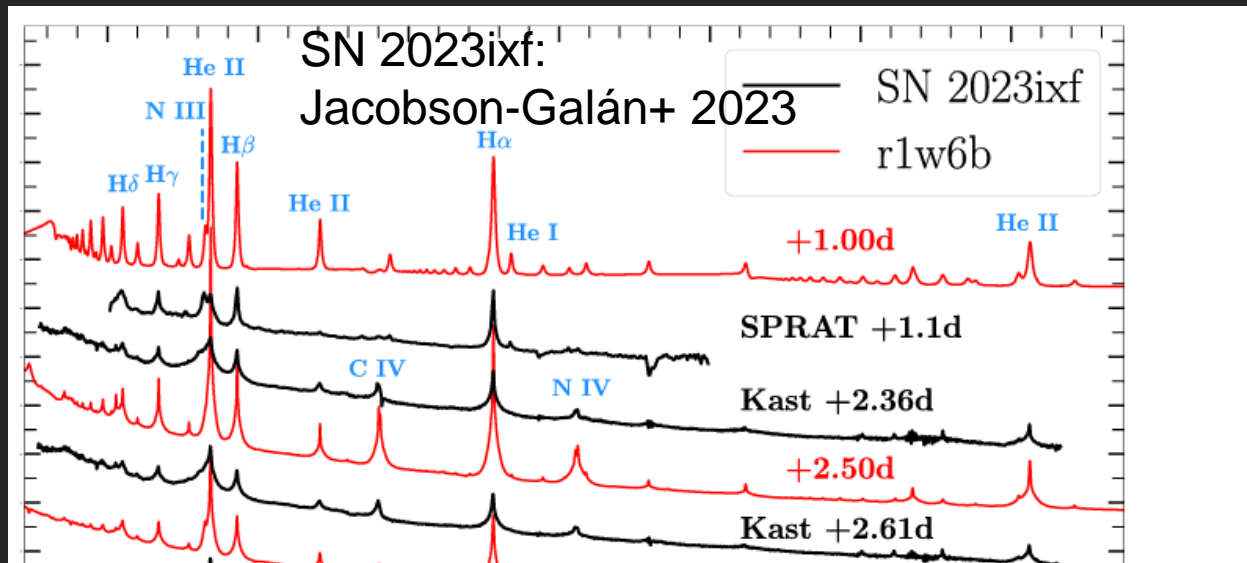


X(Si), X(S)
> A few 0.01
**Never
seen
before**

Next frontier:

Intra night observations in the first few days

- Temperature and density **change quickly** in the emitting region (e.g., at the shock wave).
- Light-travel-time limit:
 - $\Delta t \sim (R_{\text{SN}}/V_c) = (V_{\text{SN}} t_{\text{obs}}/V_c) \sim 0.03\text{-}0.1 t_{\text{obs}}$
= **(1-3) hrs** in the first day of the explosion.
- Various **new** information (CSM, progenitor, etc).



Indonesia-JP-CHN-FIN-IND collaboration?

Rapid classification of new transients:

WFST (Jian's talk), Tomo-e
⇒ Seimei + Timau

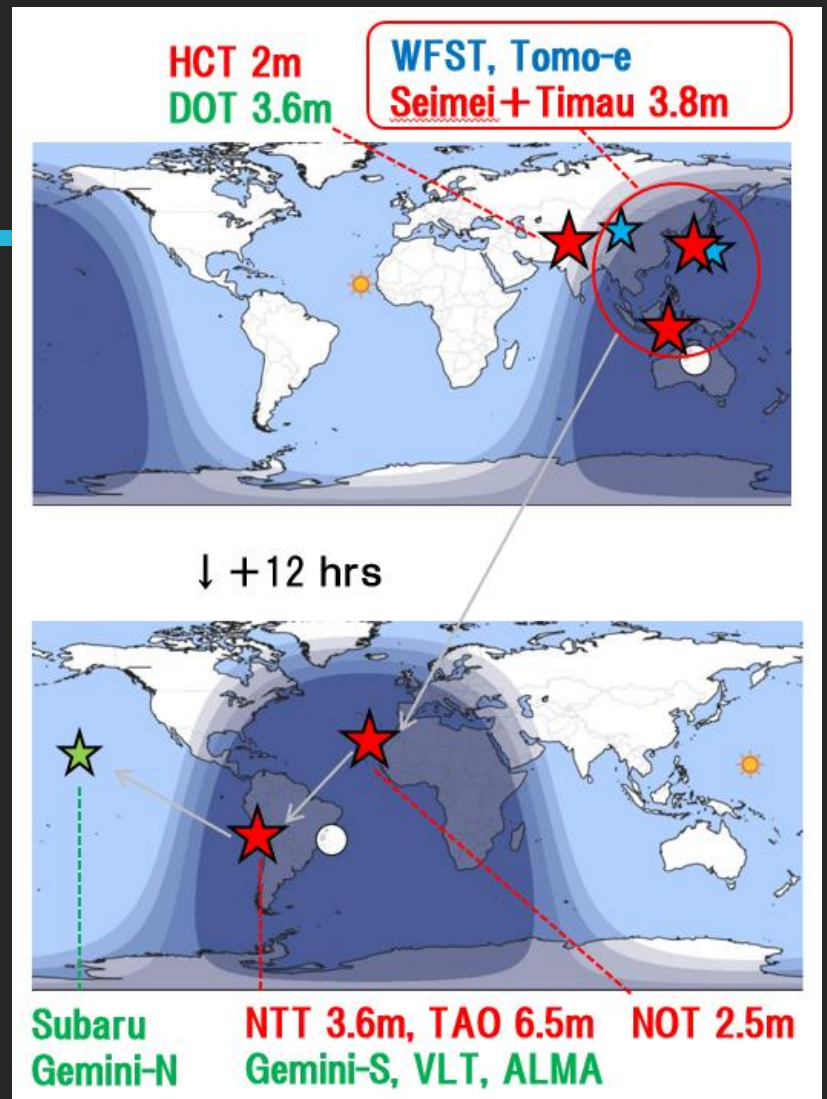
Not to miss even a single (nearby) object!

Intra-night follow-up:

Red: internal access

Green: proposals

First-ever Characterization of transients in the first night.



Lols: BRIN (ESM) – KU (KM)

JSPS Fund for the Promotion of Joint International Research [PI:KM] 2024-2028
“Expanding the Supernova Research Horizon by Seimei + Timau telescopes:
Final Evolution of Stars as Tackled through Intra-Night Observations”