An extended aspherical explosion of a core-collapse

supernovae

<u>OTakashi Nagao (ESO)</u>, A. Cikota, F. Patat, S. Taubenberger, M. Bulla, T. Faran, D. J. Sand, S. Valenti, J. E. Andrews, and D. E. Reichart SNR II, 3-8 June 2019, @Creta



1. Continuum polarization of SNe IIP



The aspherical core model

5. Time evolution of the continuum pol.





Asymmetries exist not only in the helium core but also in a significant part of the hydrogen envelope

3. Observations

FORS2@VLT telescope Spectropolarimetry X Imaging polarimetry 58000 (c)ESO

Timing of observations



4. Polarimetric spectrum at the pol. peak



6. Properties of SN 2017gmr

SN is a very energetic bright SN IIP

Plateau luminosity: ~ -17.5 mag Plateau length: ~ 100days Ejecta velocity: ~ 15000 km/s Ni mass: ~0.12 M_s



7. Summary

· We found an unusually early rising of the polarization without wavelength dependence in SN 2017gmr

This implies that SN 2017gmr has an extended aspherical explosion geometry, and also that there is intrinsic diversity in the aspherical geometry of the SN explosions

No wavelength dependence => aspherical geometry

• This results provide new constraints on the explosion mechanism of core-collapse SNe, i.e., proposed explosion models must produce such extended asphericity and also account for the diversity in the aspherical structure.

• It is important to investigate relations between the polarization and SN properties using more samples for understanding the explosion mechanism