Old and new dust associated with SN1995N



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Dust can form efficiently in the expanding ejecta of core collapse supernovae



Indebetouw et al. 2014, ApJL, 782, 2

Dust masses from radiative transfer modelling of SN1987A could be fitted by a sigmoid curve, suggesting peak growth around 10 years after the explosion



Wesson et al. 2015, MNRAS, 446, 2089

Copenhagen, 12 June 2018

Dust cools and fades rapidly, making SED fitting impractical except for young nearby objects. An independent dust mass estimate can be obtained from emission line profiles



damocles: Bevan & Barlow, 2016, MNRAS, 456, 1269

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Independent dust masses from emission line profile fitting could be fitted by a similar sigmoid curve



Bevan & Barlow, 2016, MNRAS, 456, 1269

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This sigmoid agrees well with the growth curve of Gall et al. 2014



Gall et al, 2014, Nature, 511, 326

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Gall et al, 2014, Nature, 511, 326

But it does not agree well with theory



There is still a large gap of age for which the newly formed dust mass is not quantified



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Gall et al 2014 Nature 511 326

SN1995N was a Type IIn supernova, discovered in May 1995, several months after it exploded



Pollas et al., IAUC 6170

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Spitzer and WISE observations of SN1995N reveal thermally echoing dust, with a mass estimated by van Dyk (2013) of 0.05-0.12M $_{\odot}$



adapted from Van Dyk, 2013, AJ, 145, 118

Radiative transfer models with *mocassin* broadly agree but suggest a higher dust mass, located in a thin shell, 0.25pc from star (1000 years at 200km/s)



We obtained XSHOOTER observations of line profiles at day ${\sim}7665.$ These reveal a further ${\sim}0.2M_{\odot}$ of newly formed dust in the expanding ejecta



Vmin=1080km/s, Vmax=3600km/s

Archival XSHOOTER spectra from July 2010 have quite similar profiles to our 2016 observations. A lower dust mass is required to fit these.



Fransson et al. 2002 saw line profiles changing from symmetric at day 716 to asymmetric at days 1000 and 1700



Fransson et al., 2002, ApJ, 572, 350

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The symmetry of the day 700 profile is incompatible with a dust mass any greater than $10^{-5} M_{\odot}$



Summary



• Emission line fitting in SN1995N favours ongoing dust formation at very late times. Analysis of further objects underway!