Towards the Core Collapse Supernova Rate in the SDSS-II Supernova Survey

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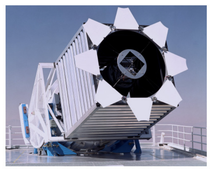
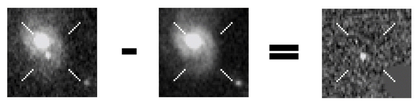
DATA



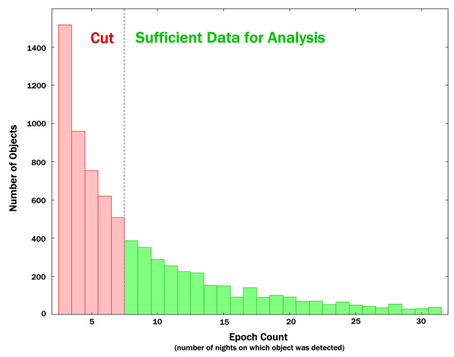
SDSS 2.5m primary telescope
(Apache Point, New Mexico USA)

rolling photometric search
surveys a 300 sq. degree stripe of sky
entire stripe re-imaged every two days

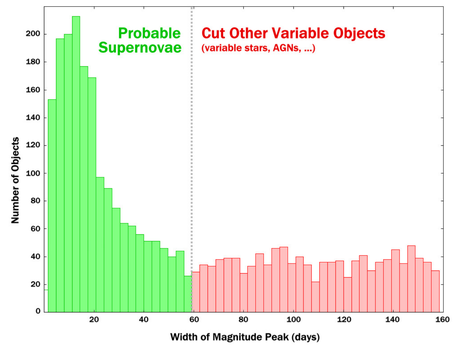
1 Image subtraction reveals transient objects

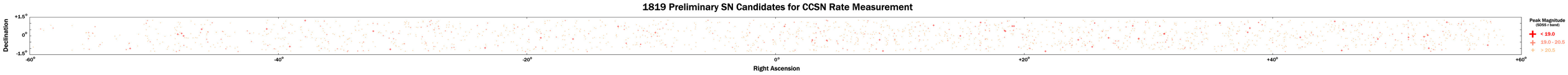


2 Cut objects detected on fewer than eight nights of the survey



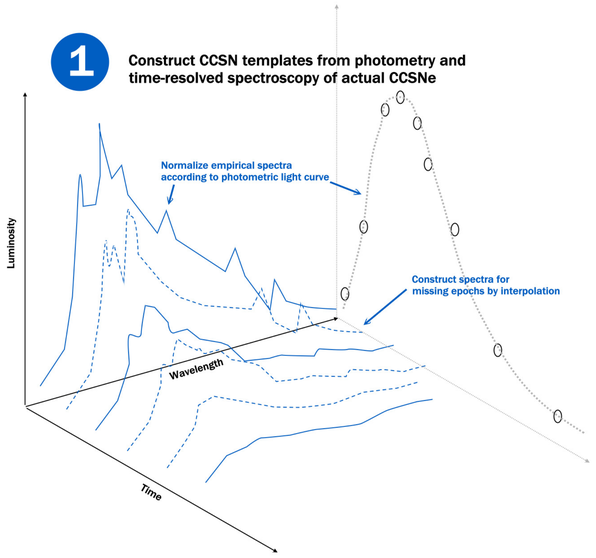
3 Cut objects with magnitude peak of width greater than 60 days





MODEL

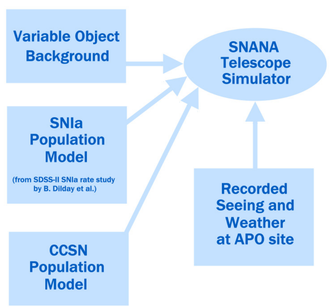
1 Construct CCSN templates from photometry and time-resolved spectroscopy of actual CCSNe



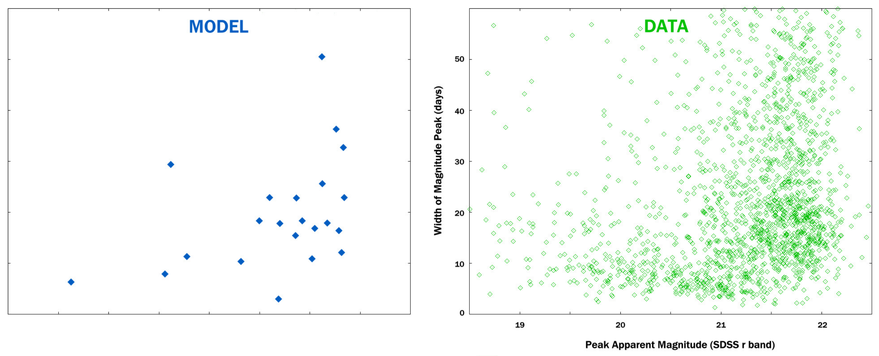
2 Apply model CCSN distribution with adjustable parameters

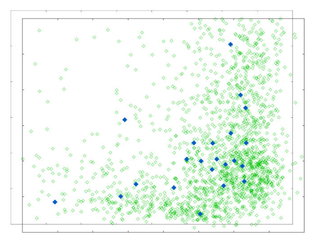
$$\rho_{CCSN}(a_1 , a_2 , \ldots , a_N ; z , m)$$

3 Simulate observation of model objects at SDSS telescope



4 Calculate object density as a function of direct observables





5 Compare simulated and observed distributions of observables

POOR FIT

GOOD FIT

6 Adjust CCSN population parameters toward similarity with observed data

7 Marginalize over best-fit CCSN population model to find CCSN rate