

# SPATIAL DISTRIBUTION OF DIFFERENT SUBTYPES OF CORE- COLLAPSE AND THERMONUCLEAR SUPERNOVAE IN THE GALAXIES

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# History: 1981 75 SNe

## The space distribution of type I and type II supernovae in spiral galaxies

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In spiral galaxies the layer within which type I supernovae occur is less thick than the dust layer. Type I and type II supernovae have the same radial surface-density gradient.

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$$\log \sigma = 1.82 - 1.07r_c \text{ SN I (47)} \\ \pm 0.10 \pm 0.17$$

$$\log \sigma = 1.62 - 1.12r_c \text{ SN II (28)} \\ \pm 0.08 \pm 0.11$$

# History: 1992 494 SNe

Astron. Astrophys. 264, 428-432 (1992)

ASTRONOMY  
AND  
ASTROPHYSICS

## The radial distribution of supernovae in galaxies

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**Abstract.** Radial distributions for different types of supernovae (SNe) in the parent galaxies were investigated. The effect of distance on the probability of discovering SNe in central parts of galaxies is confirmed; we also detected a selection effect when comparing data for photographic SN searches with results of visual searches and searches using CCD detectors. It is shown that the surface density of SNe decreases with radius like the surface brightness of galaxies, but that the SNe distribution is continuing far beyond the optical radius of galaxies. We have revealed some differences in radial distributions of various types of supernovae in galaxies of differing Hubble type.

**Key words:** supernovae and supernova remnants: general – galaxies: stellar content of

### 1. Introduction

Statistical investigations of supernovae (SNe) have been considered important clues to the nature of SN precursors. SNe rates and spatial distributions in galaxies of different Hubble types are

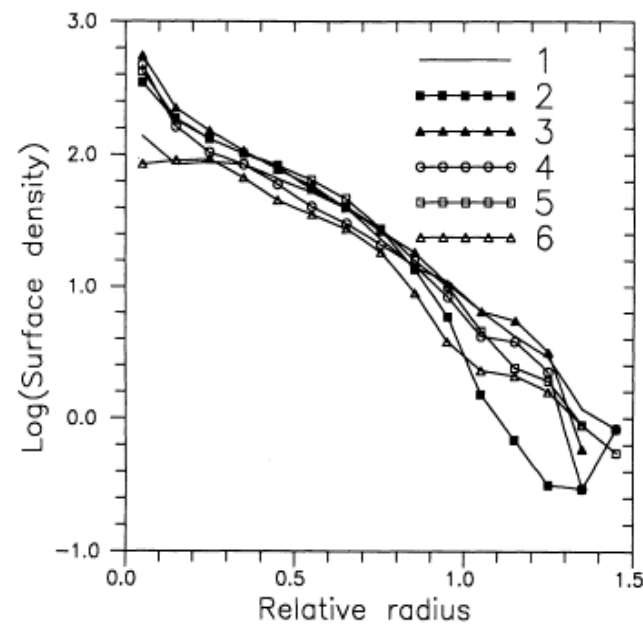
d) no significant difference has been found between radial distributions of SNe I and II and between distributions of SNe in spiral galaxies of different Hubble types;

Recently it became clear that SNe I are divided into at least two distinct classes with different progenitors. We should also mention the fast growth of the number of SNe suitable for analysis. So a new investigation of the SN radial distribution appears necessary.

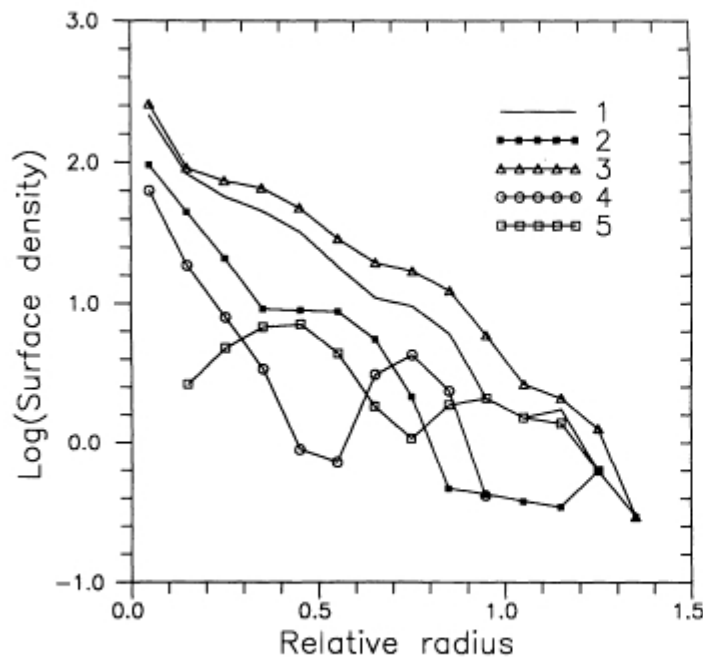
### 2. Definition of the sample and selection effects

We have compiled a catalogue of 762 SNe discovered up to October 1, 1991. It is similar to the recently published Asiago Supernova Catalogue (Barbon et al. 1989), but includes also data on the position angles of galaxies. After rejection of SNe, for which the available data were incomplete, we were able to include 494 SNe into the final sample for the investigation of their radial distribution. Among them 140 are of type I (67 of type Ia and 22 of type Ib) and 99 of type II (13 of type IIP and 12 of type IIL).

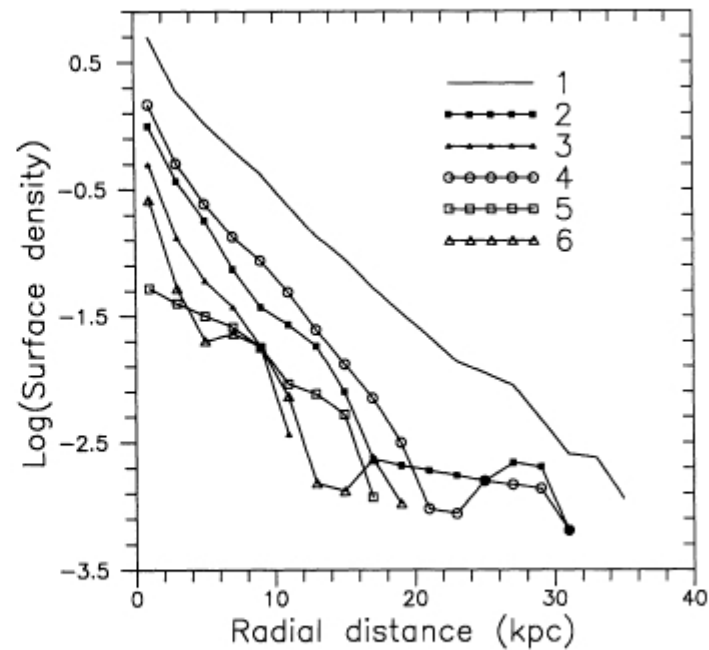
We studied the radial distributions of SNe using data on their relative radial distances and absolute radial distances, expressed



**Fig.1.** Radial distributions of SNe in galaxies with different angular diameter  $D$  and distance  $d$ : curve 1 -  $D \leq 1.5'$ , 2 -  $1.5' < D \leq 3'$ , 3 -  $D > 3'$ , 4 -  $d \leq 17$  Mpc, 5 -  $17 \text{ Mpc} < d \leq 70$  Mpc, 6 -  $d > 70$  Mpc



**Fig.4.** Radial distributions for different SNe types in all galaxies: 1 - SNe Ia, 2 - SNe Ib, 3 - SNe II, 4 - SNe IIP, 5 - SNe IIL



**Fig.6.** Radial distributions for different types of SNe in all galaxies versus radial distance in kpc: 1 - all SNe, 2 - SNe Ia, 3 - SNe Ib, 4 - SNe II, 5 - SNe IIL, 6 - SNe IIP

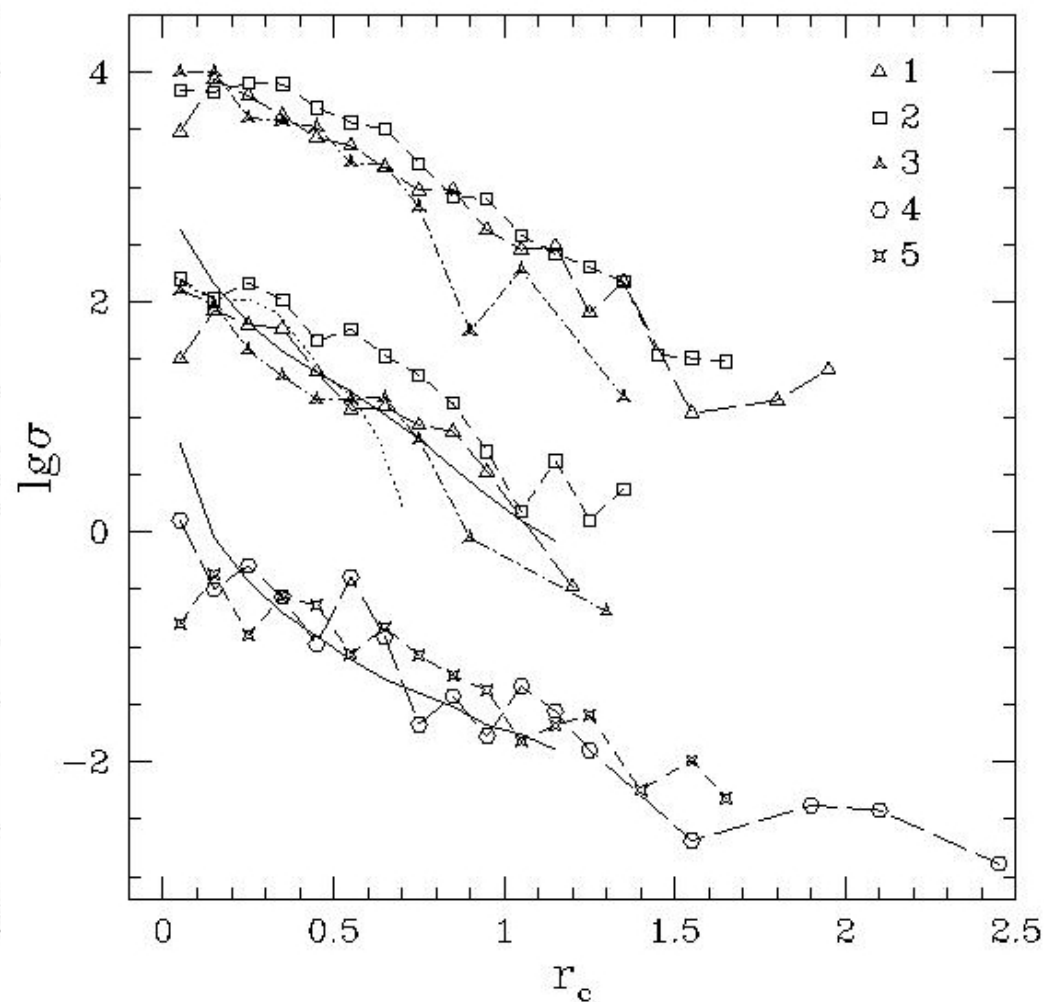
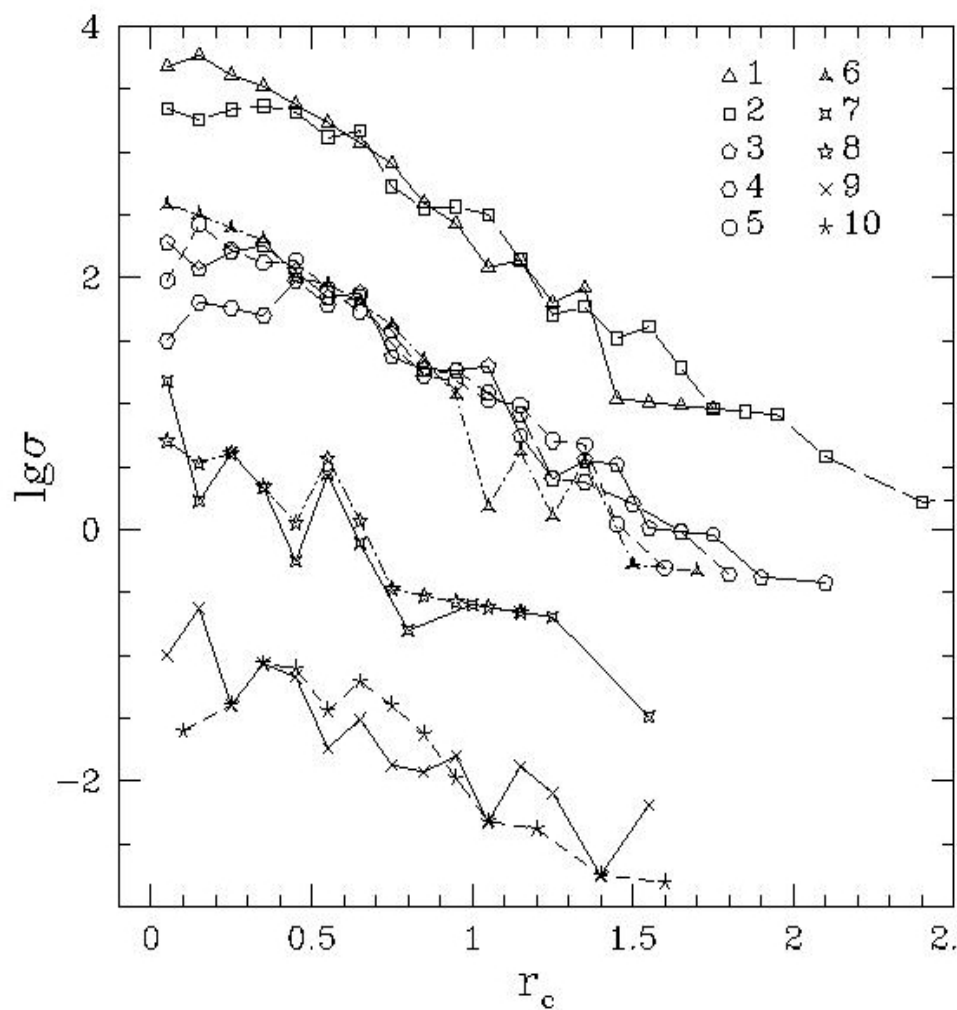
# History: 2004 1084 SNe

The SAI Catalog of Supernovae and Radial Distributions  
of Supernovae of Various Types in Galaxies

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*2016: 2341 SNe      II: 984; Ibc: 309; Ia: 1048*

*$V_r < 6000$  km/s;  $i < 70$  deg; Spiral galaxies*

*IIP: 131; IIIn: 63; IIb: 41; IIL: 13; Ib: 89; Ic: 60*

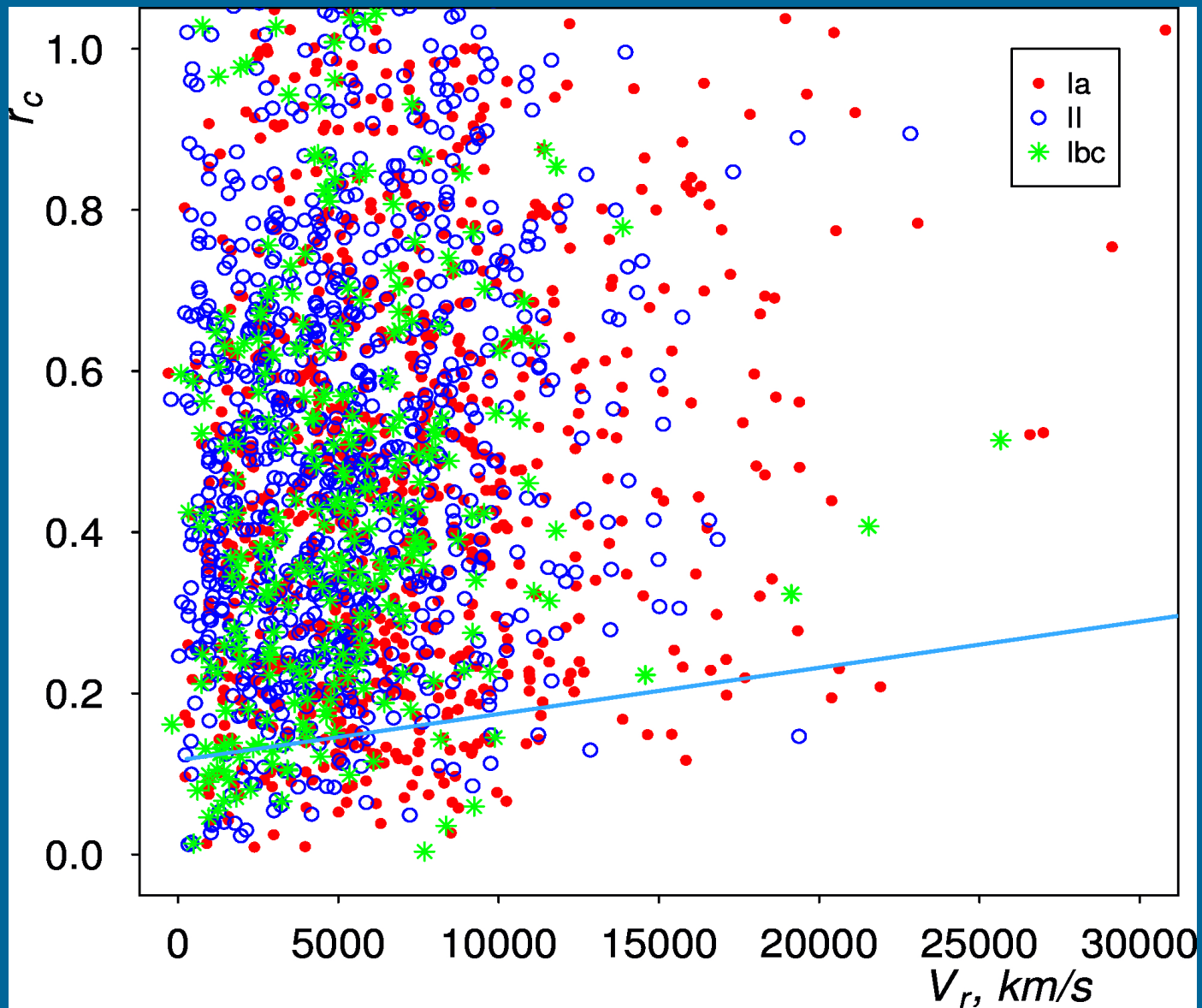
*Ia-norm: 167; Iax: 20; 91bg: 14; 91T: 10*

*SAI SN Catalogue:*

*<http://www.sai.msu.su/sn/sncat/>*

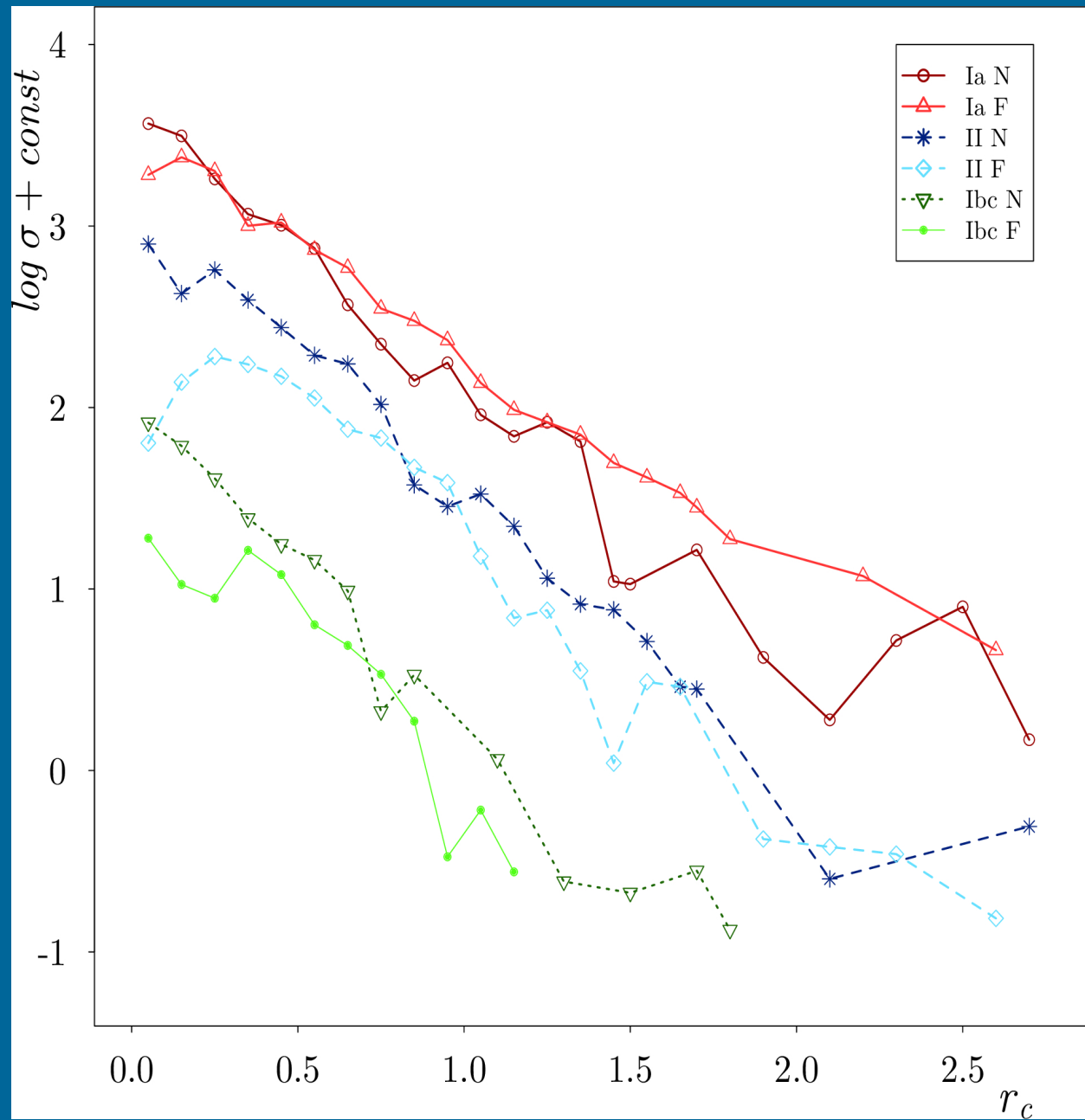
*2016-01-01: 7482 SNe*

# Selection effect

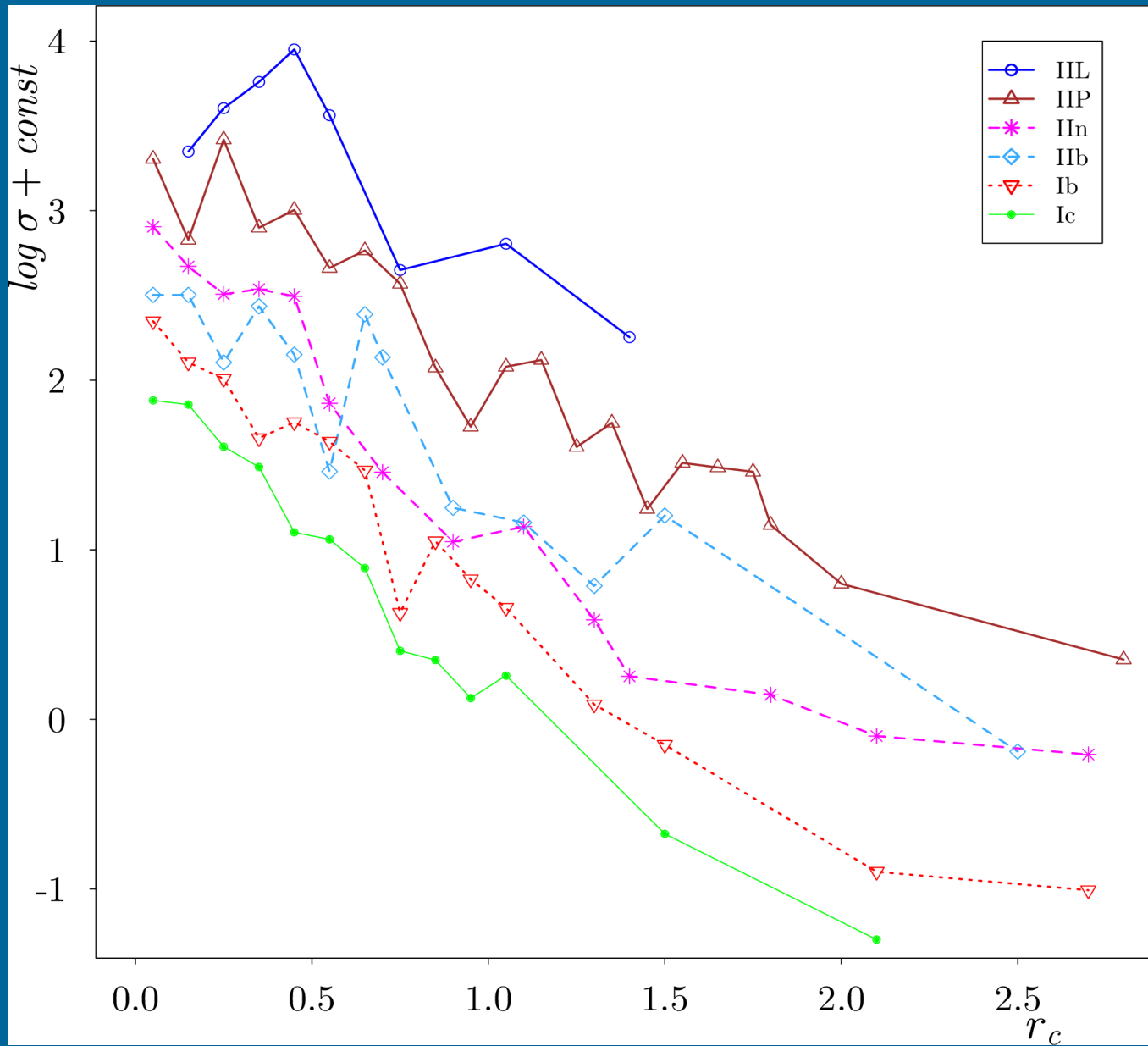




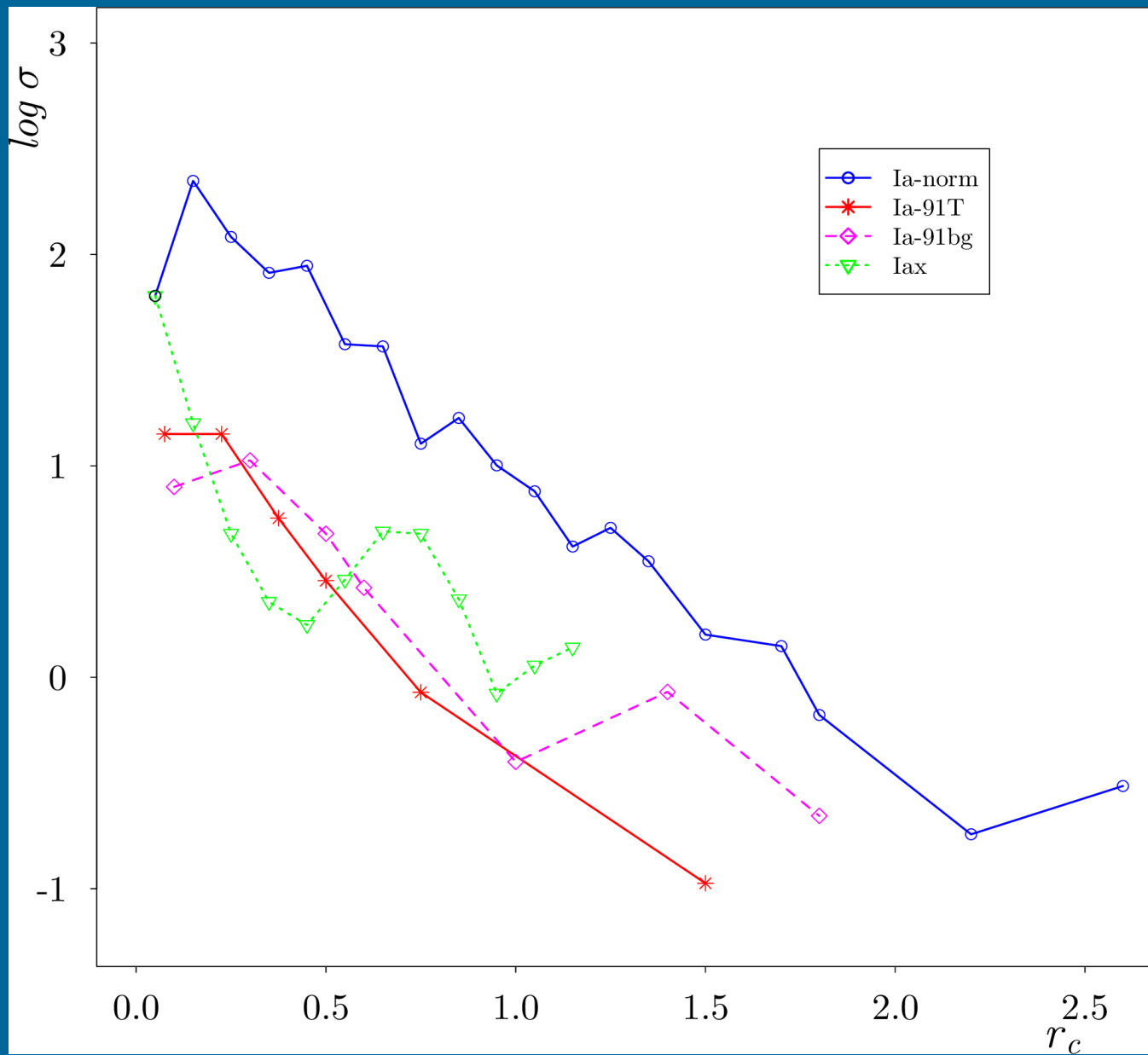
# Selection effect



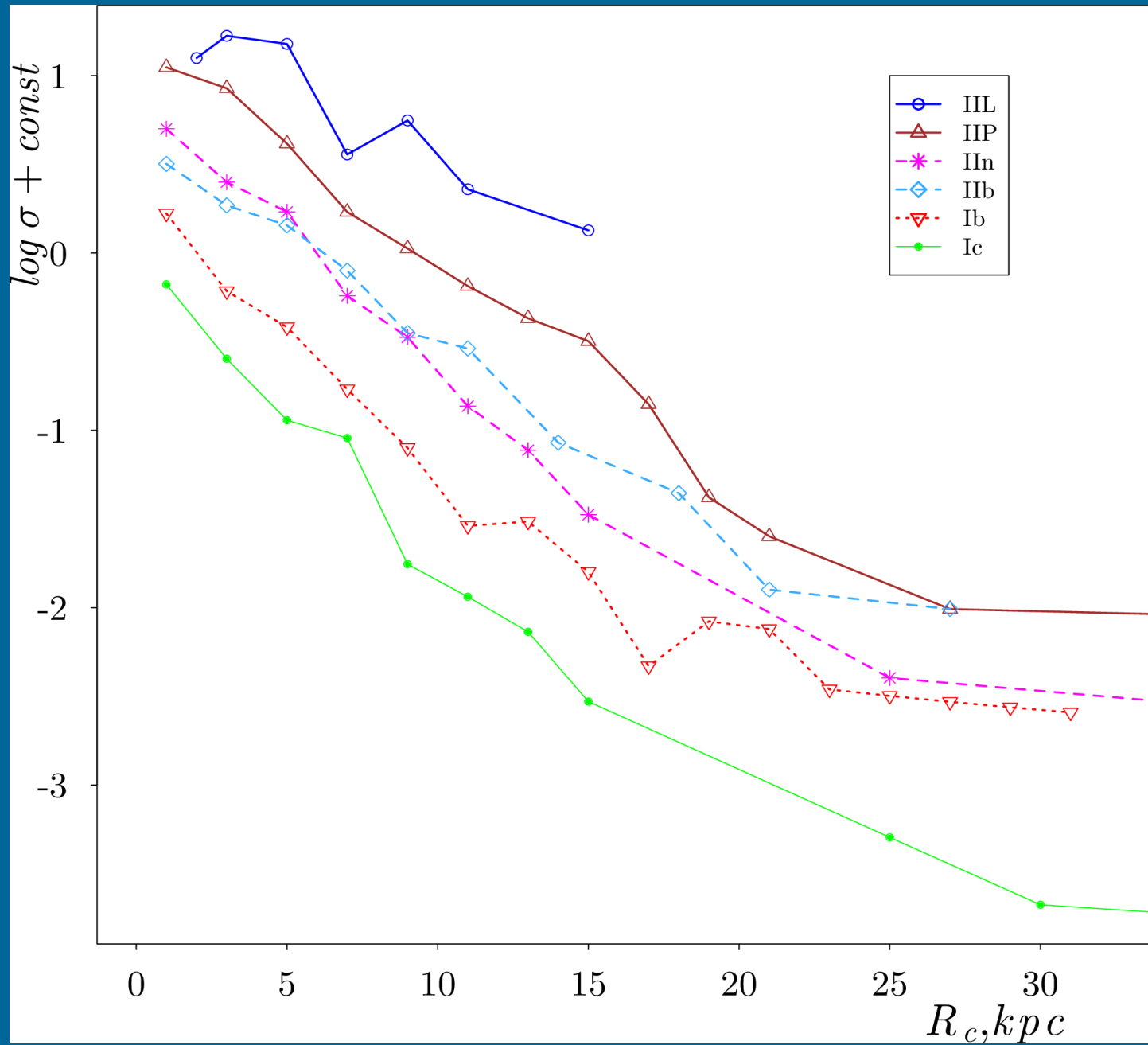
# Radial distribution of subtypes of CCSNe



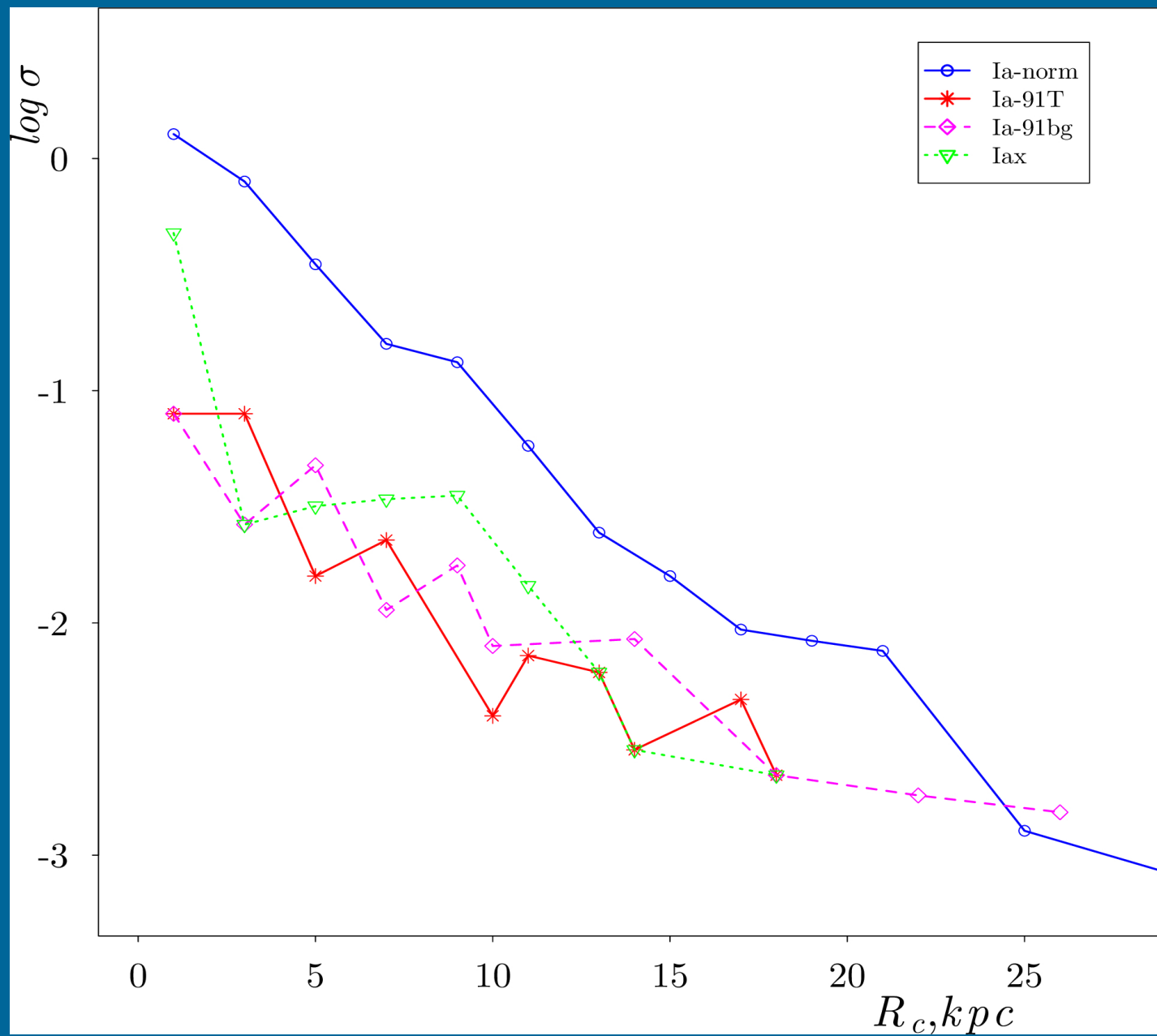
# Radial distribution of subtypes of Thermonuclear SNe



# Radial distribution of subtypes of CCSNe



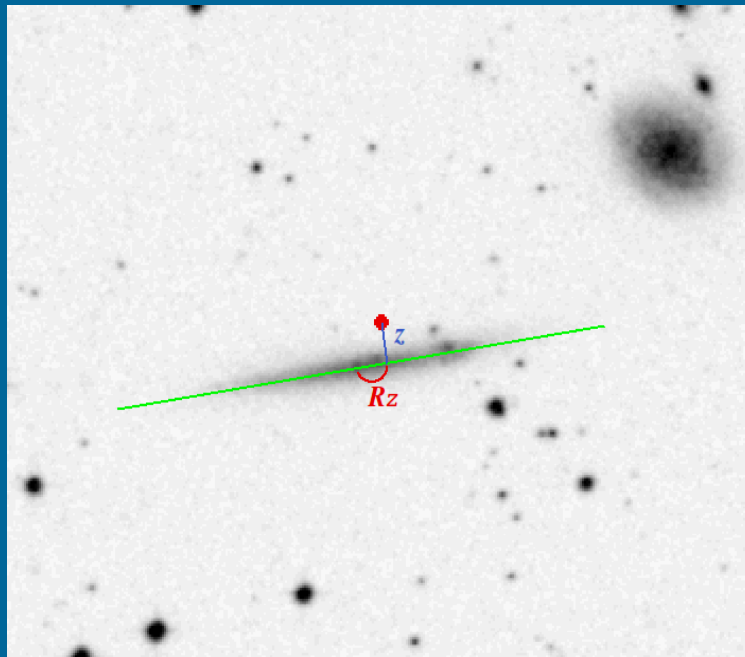
# Radial distribution of subtypes of Thermonuclear SNe



# Vertical distribution of SNe

SN 2014dq

<i>SNe Ia</i>	26	$z_0 = 0.030 \pm 0.006$	0.55	0.11 kpc	
<i>SNe II</i>	44	0.029	0.005	0.50	0.08 kpc
<i>SNe Ibc</i>	8	0.024	0.006	0.40	0.14 kpc



# Vertical distribution of SNe

