The number of SN II sample is corrected as below.

$$N_{eff}dL = N_{sdss}dL \times \frac{V_{z<0.17}}{V_{z<z_{max}(L)}}$$

Here, $N_{sdss}dL$ is the number of SDSS SNe II in the range of

$$L - \frac{dL}{2} < L < L + \frac{dL}{2},$$

and $z_{max}(L)$ is a redshift where intersect with flux limit at given L (see the figure below). N_{eff} is derived by multiplying N_{sdss} with the comoving volume ratio.

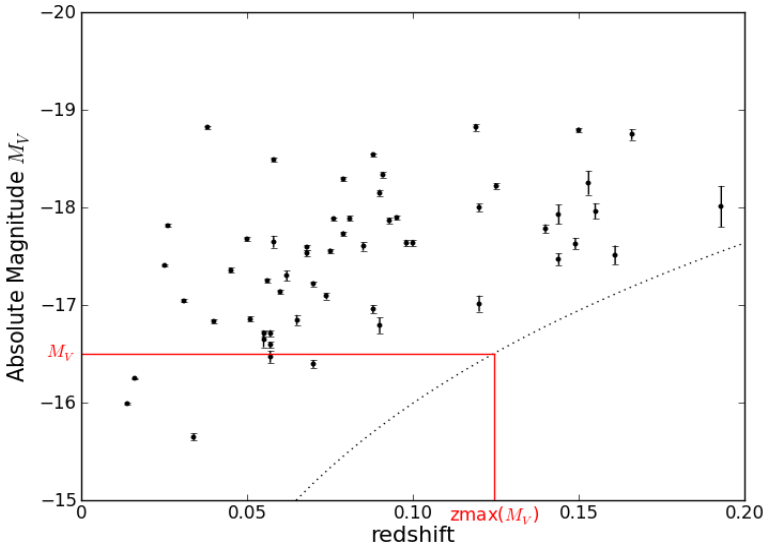

Fig. 1: The illustration of a function $z_{max}(M_V)$.

Following the formula, the number of SN II sample is corrected as in Figure 2. Since fainter SNe are incomplete according to the redshift, the correction factor is larger in low-luminosity bins.

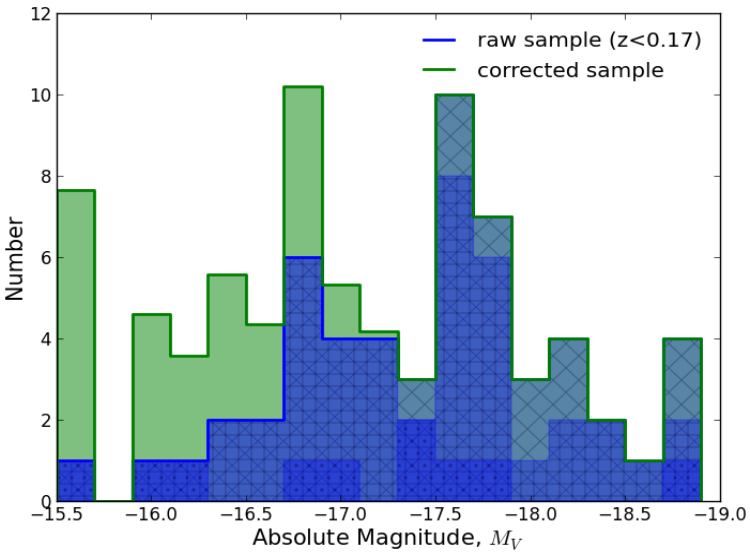

Fig. 2: The magnitude distribution of N_{eff}(green) and N_{sdss}(blue). The hatched blue histograms represent "$z < 0.20$ cut" (cross hatch), "$z < 0.12$ cut" (grid), "$z < 0.05$ cut" (dots).

The resulted control-time is shown in Figure 3. Now that we have more faint SNe II, the control-time become smaller (it roughly follows "$z < 0.05$ sample").

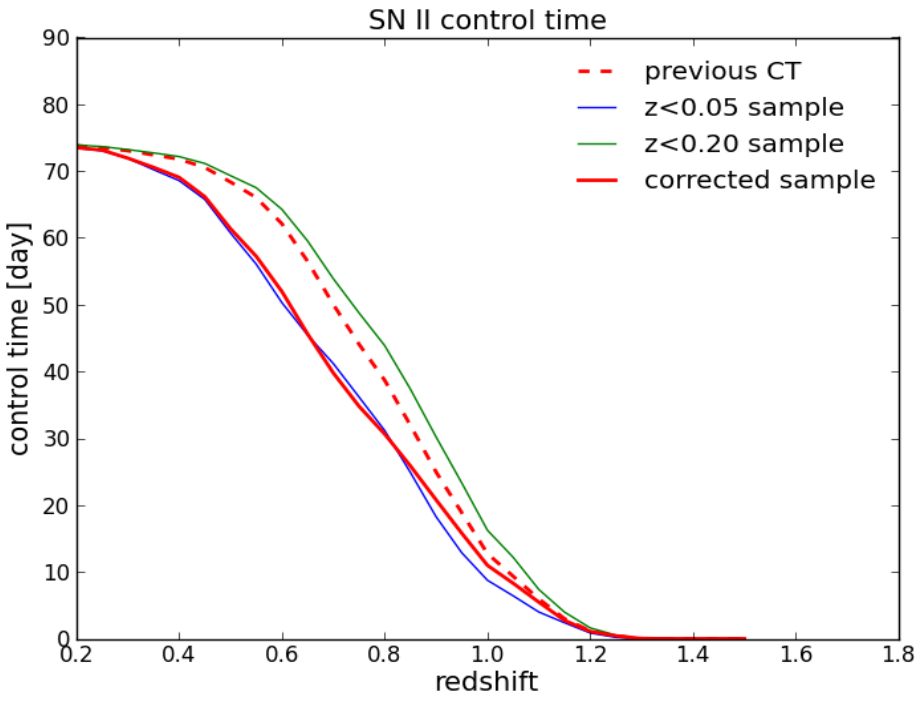

Fig. 3: The comparison of control times. The lines shows previous control-time (red dashed line), "$z < 0.05$ cut" (blue line), "$z < 0.20$ cut" (green line), and the control-time calculated from corrected sample (red solid line).