first look at the Z control sample

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what kind of production processes

- Z pole (not in H20 yet)
- e+ e- —> γZ (radiative return)
- e+ e- —> eeZ (t-channel)
- e+ e- —> $\nu\nu Z$ (WW-fusion)
- e+ e- —> ZZ (t-channel)

several factors need attention to estimate

- generators designed by DBD study are not very convenient for estimation, because the processes (Feynman diagrams) are not well separated, e.g. 4f_singleZee includes also ZZ—>eeZ, some ZZ contribution is mixed in 4f_WWZZMix and 4f_singleZsingleWMix

- this naturally suggests to use Physsim to calculate pure contribution each process; then however consistency between different generator tools needs be checked; I have compared the cross sections of ZZ by Physsim, Whizard and MadGragh, and adjusted the SM parameters to be same —> consistent within 0.5% when beamstrahlung and ISR are switched off; this in principle gives the freedom of choosing generators for estimation of control sample

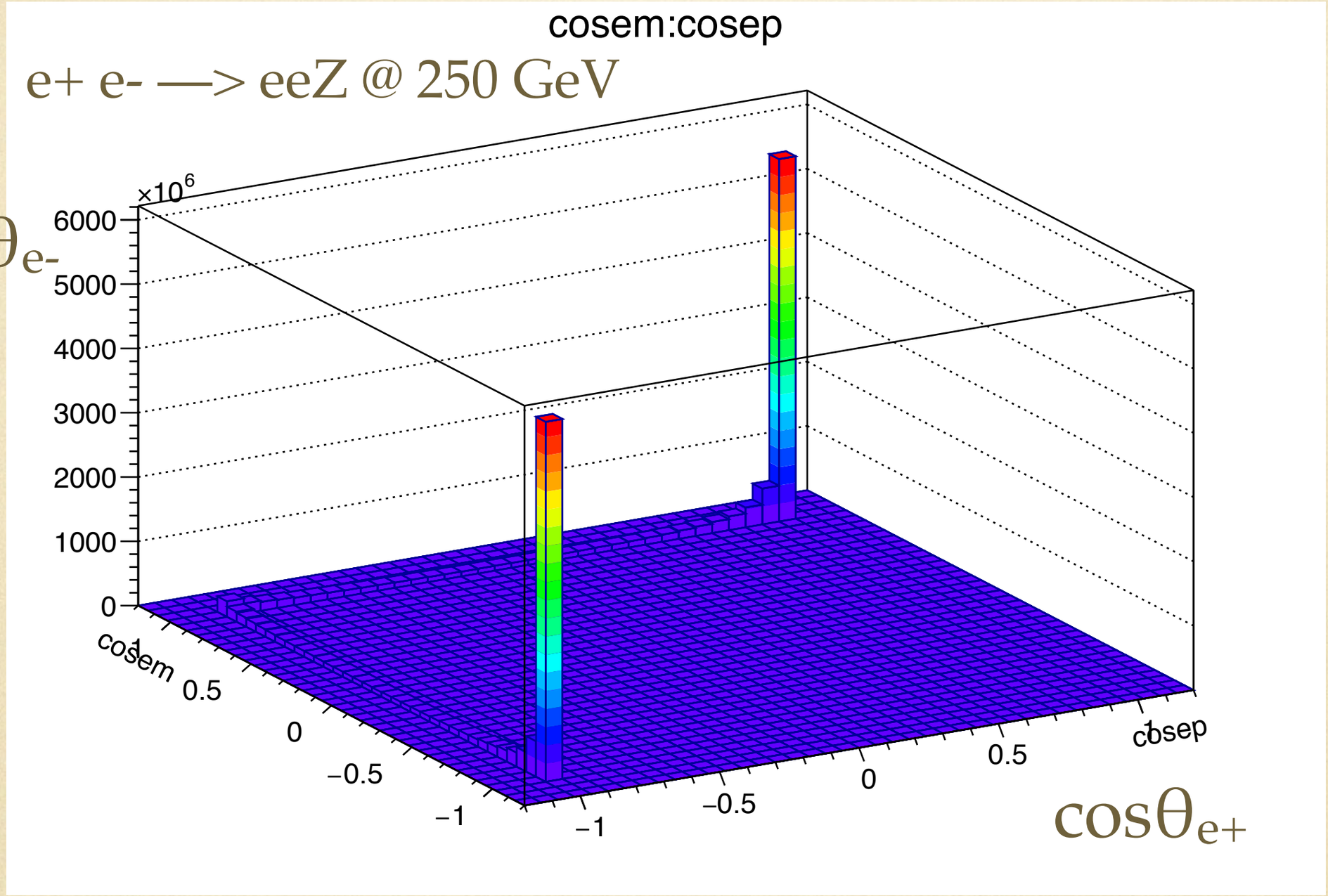
- detector acceptance plays a crucial role; though the cross sections of those control processes are sometime huge, it happens often that some key particles actually go to beam pipe hence can’t be detected

cross sections of various Z production processes

(calculated mainly by Physsim (w/o BS) except γZ)

x-sec / fb	250 GeV		500 GeV	
P(e-,e+)	(-1,+1)	(+1,-1)	(-1,+1)	(+1,-1)
ZZ	2856	1171	1323	543.5
γZ	33498	21435	13691	8740
$\nu\nu Z$	146.7	-	1036	-
eeZ	5061	3219	8294	5285

very high cross section, however



acceptance ~ 5% if $|\cos\theta|<0.99$

I wanted to plot γ angle in γZ, however on kekcc…