Event weight factors and partial luminosities for various choices of electron and positron polarization

Factor and weights for polarised running calculated assuming:

- electron beam polarisation $P_{e^-} = \pm 80\%$
- positron beam polarisation $P_{e^-} = \pm 30\%$
- H-20 running scenario at 250 GeV with total lumionsity of 2 ab^{-1}: 900 fb^{-1} for $(-,+)$ and $(+,-)$ configurations, 100 fb^{-1} for $(-,-)$ and $(+,-)$
- 2 ab^{-1} for unpolarized running (unpol.) - to be used for comparison.

	Generated sample			
	eLpR $(e^-_L e^+_R)$	eRpL $(e^-_R e^+_L)$	eLpL $(e^-_L e^+_L)$	eRpR $(e^-_R e^+_R)$
Beam polarisation setting	Weight factor			
	$\frac{(1-P_{e^-})(1+P_{e^+})}{4}$	$\frac{(1+P_{e^-})(1-P_{e^+})}{4}$	$\frac{(1-P_{e^-})(1-P_{e^+})}{4}$	$\frac{(1+P_{e^-})(1+P_{e^+})}{4}$
$(-,+)$	0.585	0.035	0.315	0.065
$(+,-)$	0.035	0.585	0.065	0.315
$(-,-)$	0.315	0.065	0.585	0.035
$(+,+)$	0.065	0.315	0.035	0.585
unpol.	0.25	0.25	0.25	0.25
	Expected H-20 sample luminosities [fb^{-1}]			
$(-,+)$	526.5	31.5	283.5	58.5
$(+,-)$	31.5	526.5	58.5	283.5
$(-,-)$	31.5	6.5	58.5	3.5
$(+,+)$	6.5	31.5	3.5	58.5
unpol.	500	500	500	500

Table 1: Weight factors to reweight event samples with a given initial-state helicity and corresponding integrated luminosities for sample normalisation at 250 GeV, for different ILC beam polarisation settings.

Final MC event weight for the analysis should be calculated as:

$$w = \frac{N_{exp}}{N_{gen}} = \frac{\sigma_{gen} \cdot \mathcal{L}_{exp}}{N_{gen}} = \frac{\mathcal{L}_{exp}}{\mathcal{L}_{gen}}$$

where N_{exp} and N_{gen} are expected and generated event numbers for given initial-state helicity, σ_{gen} is the generator level cross section and $\mathcal{L}_{gen}$ is the integrated luminosity corresponding to the generated events sample, $N_{gen} = \sigma_{gen} \cdot \mathcal{L}_{gen}$. $\mathcal{L}_{exp}$ is the expected H-20 integrated luminosity for given initial-state helicity, as given in the Table 1.