

# Recent Status

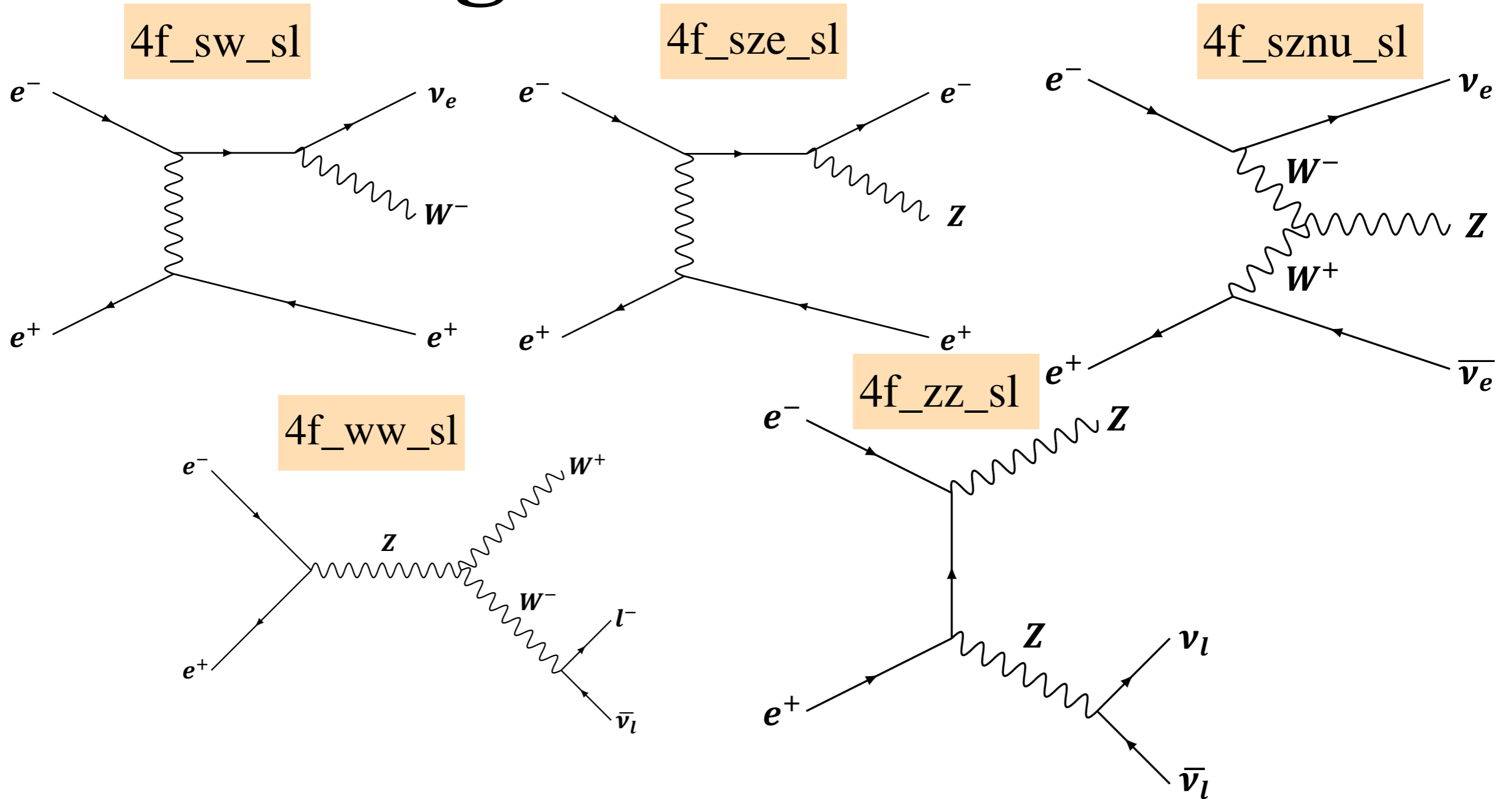


**MIZUNO Takahiro**

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# Background exclusion

2



Cut 1 Number of energetic photons ( $> 50 \text{ GeV}$ ) is 0

Cut 2  $120 \text{ GeV} < E_{vis}$  (sum of 2 jet energies)  $< 160 \text{ GeV}$

Cut 3 Total direction of the visible particles  $|\cos Z| > 0.95$

Cut 4  $50 \text{ GeV} < (\text{Reconstructed } Z \text{ mass } m_Z) < 160 \text{ GeV}$

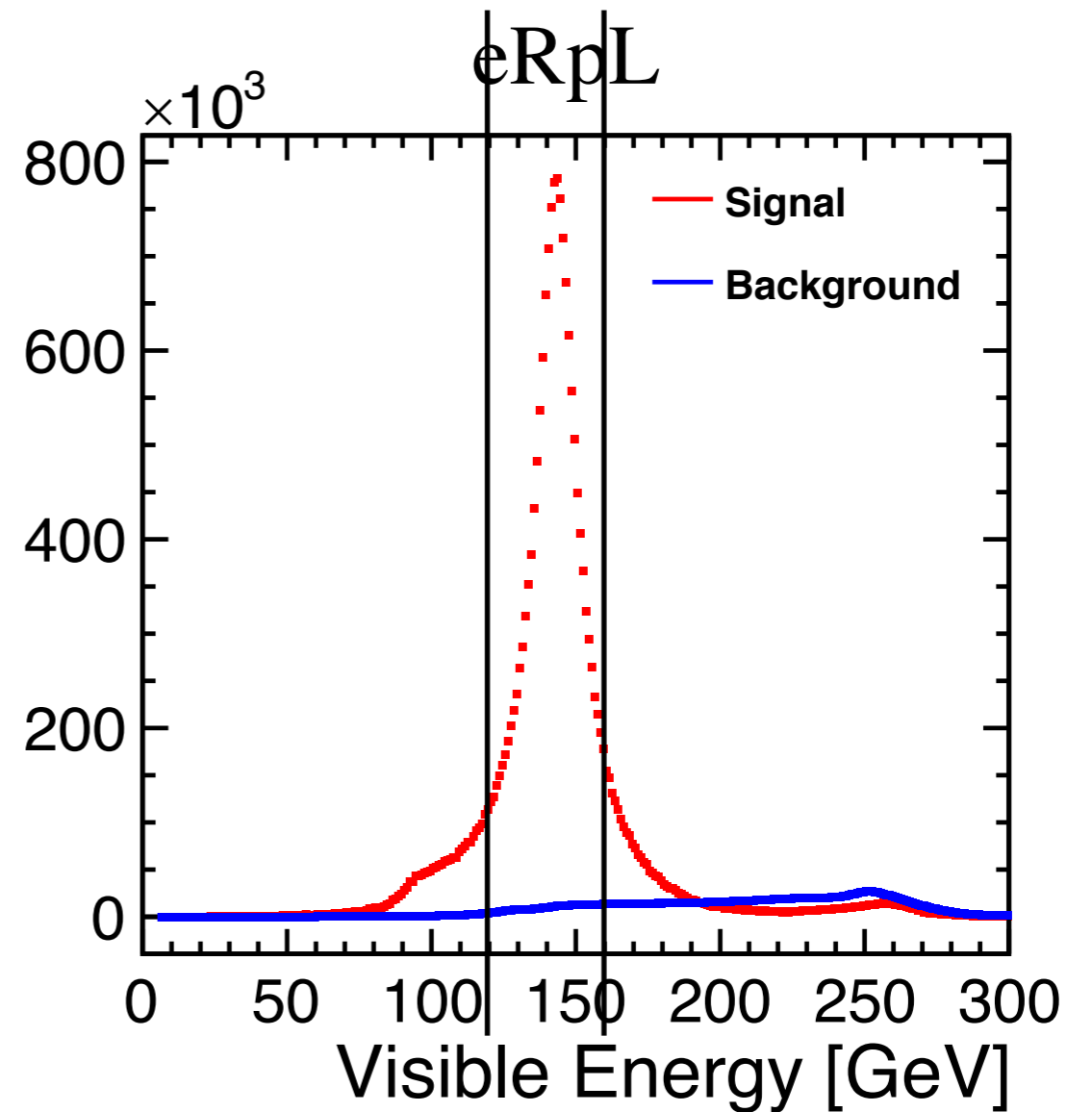
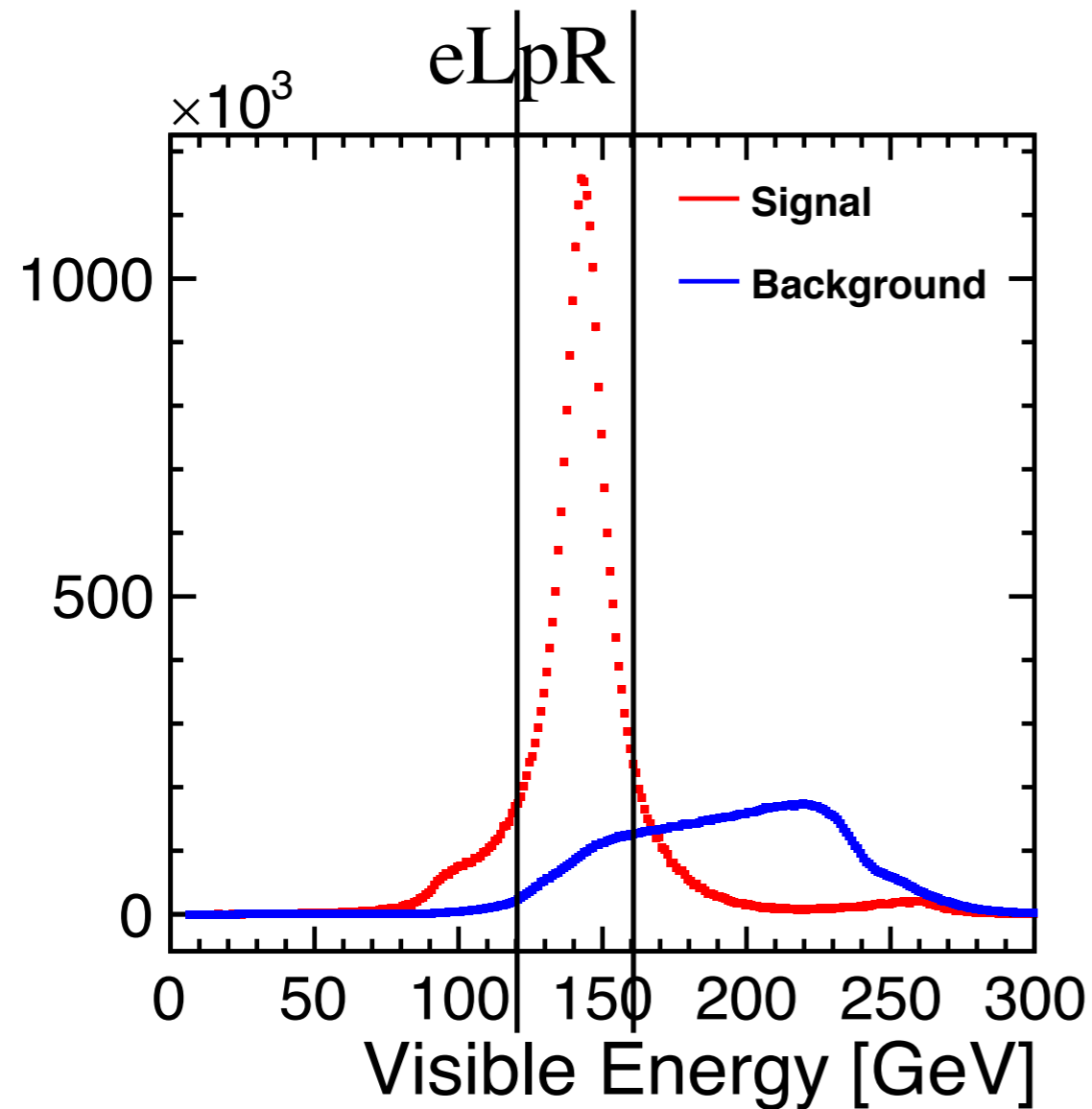
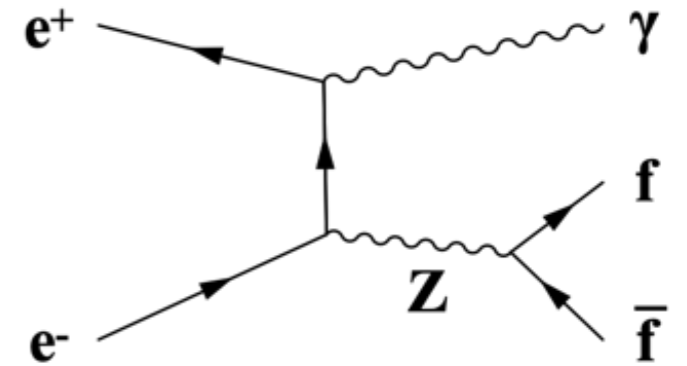
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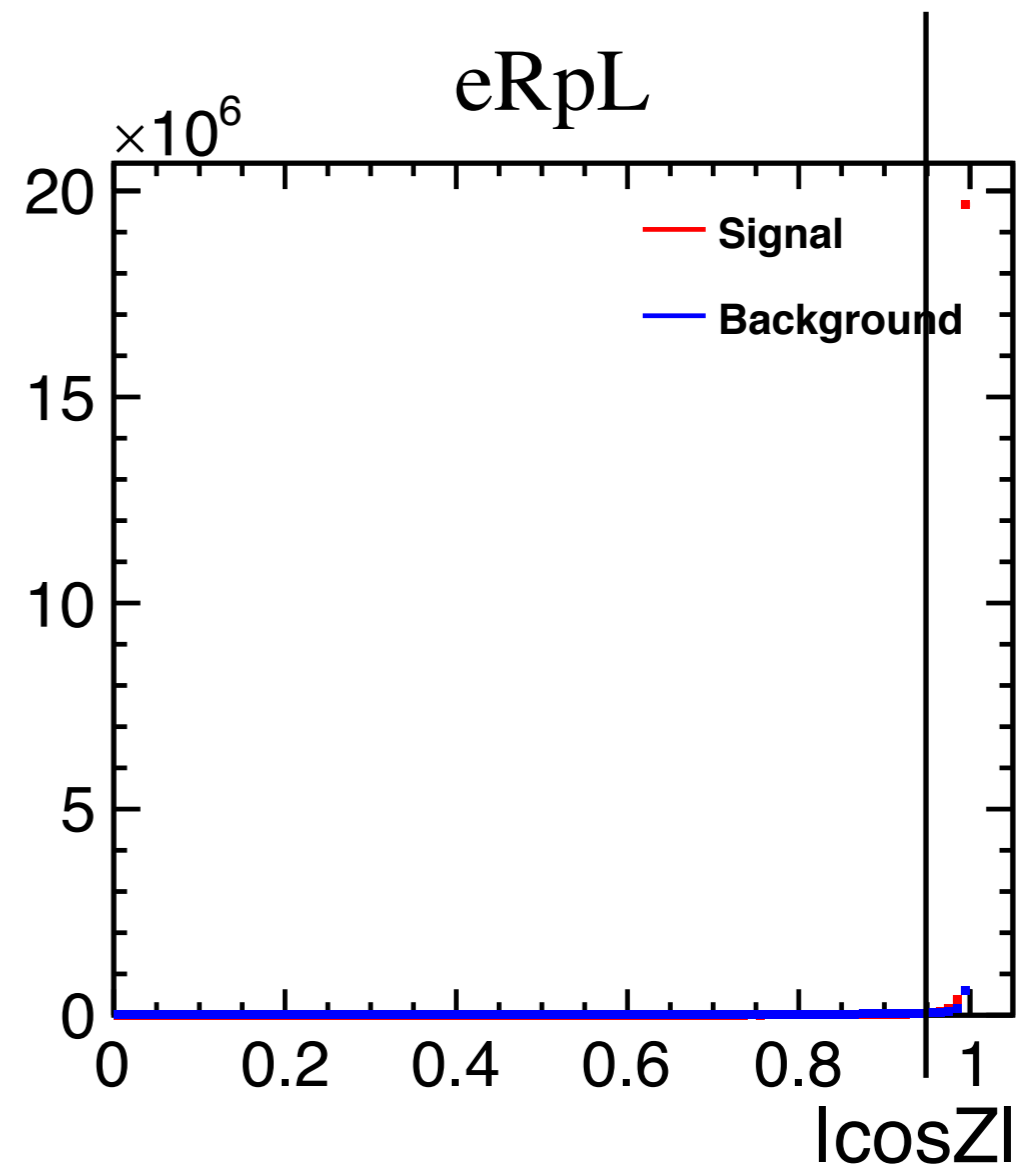
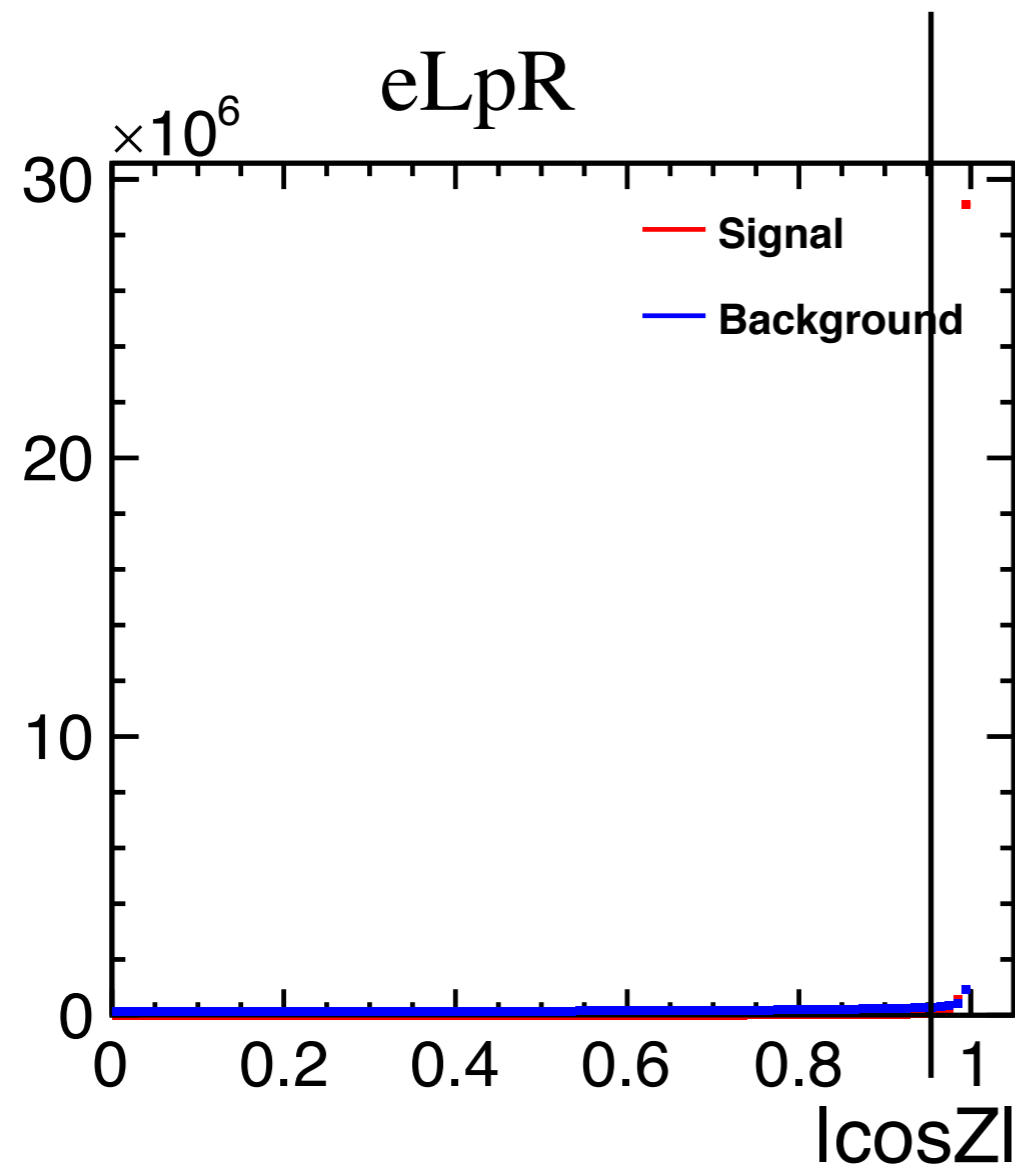
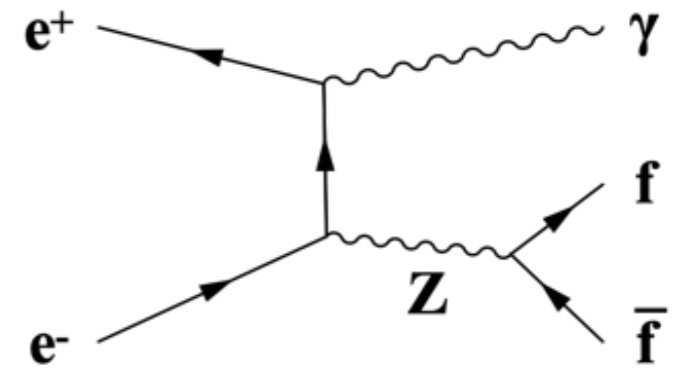
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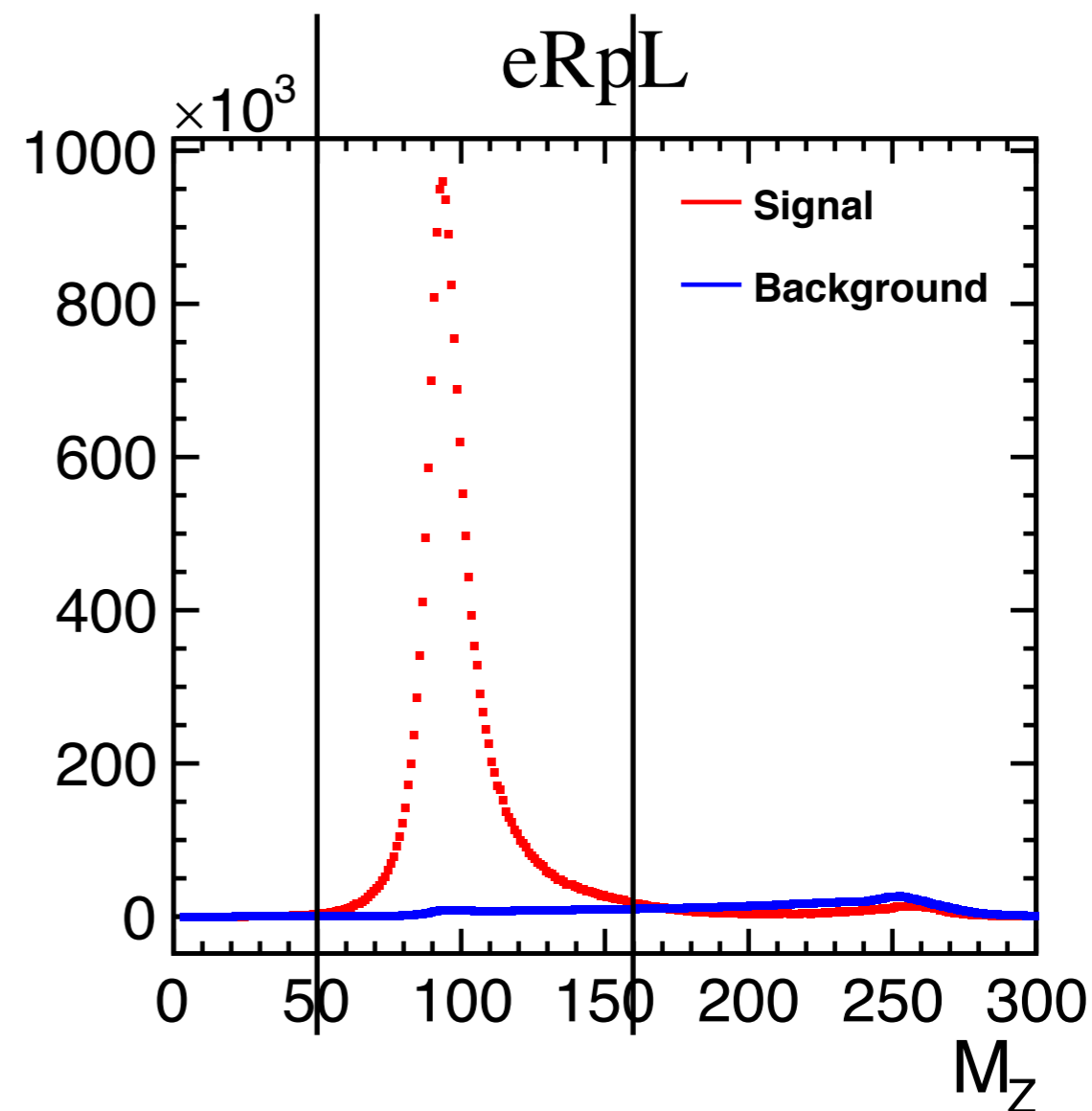
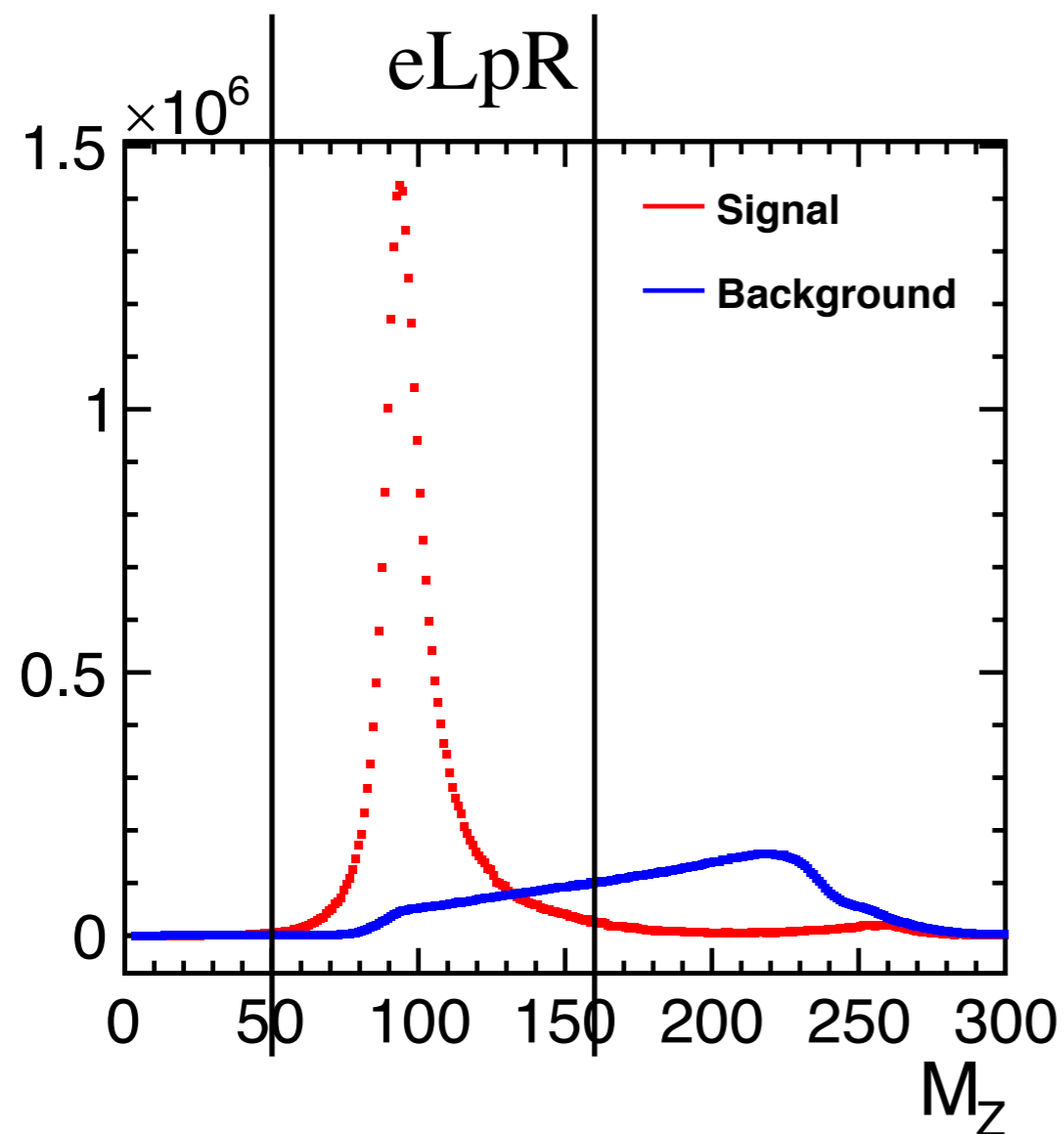
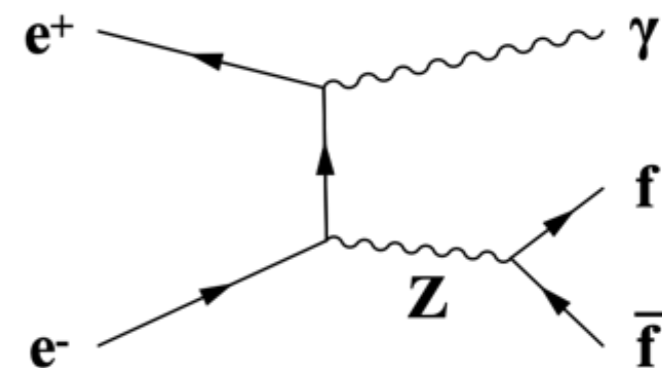
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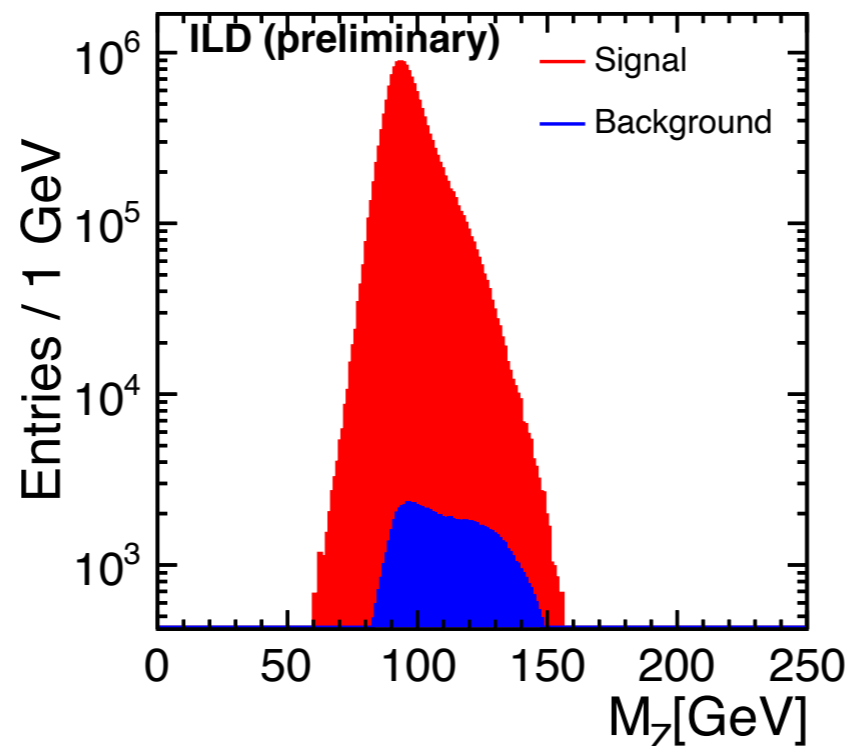
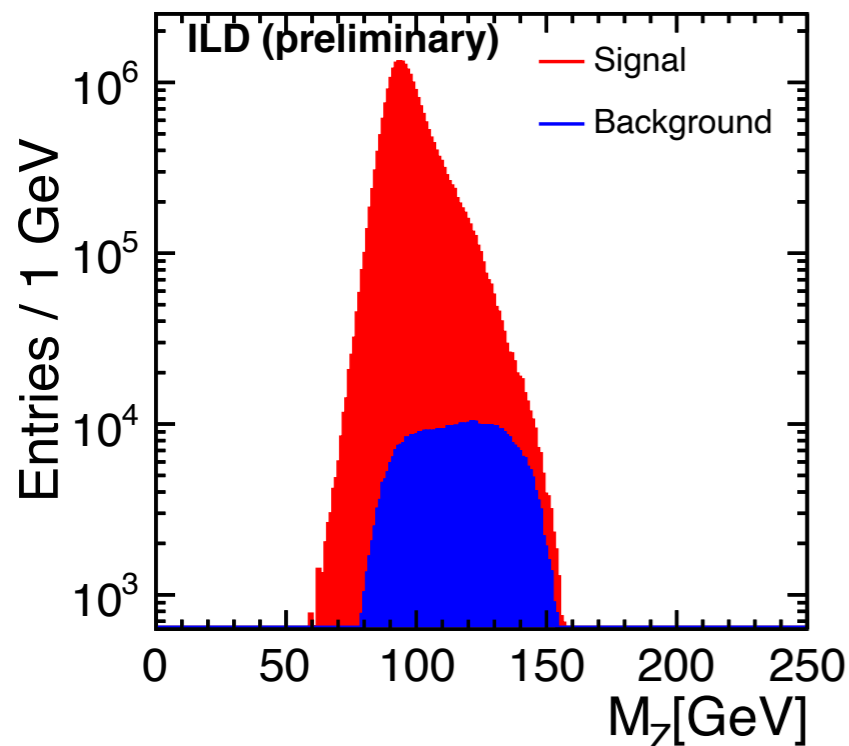
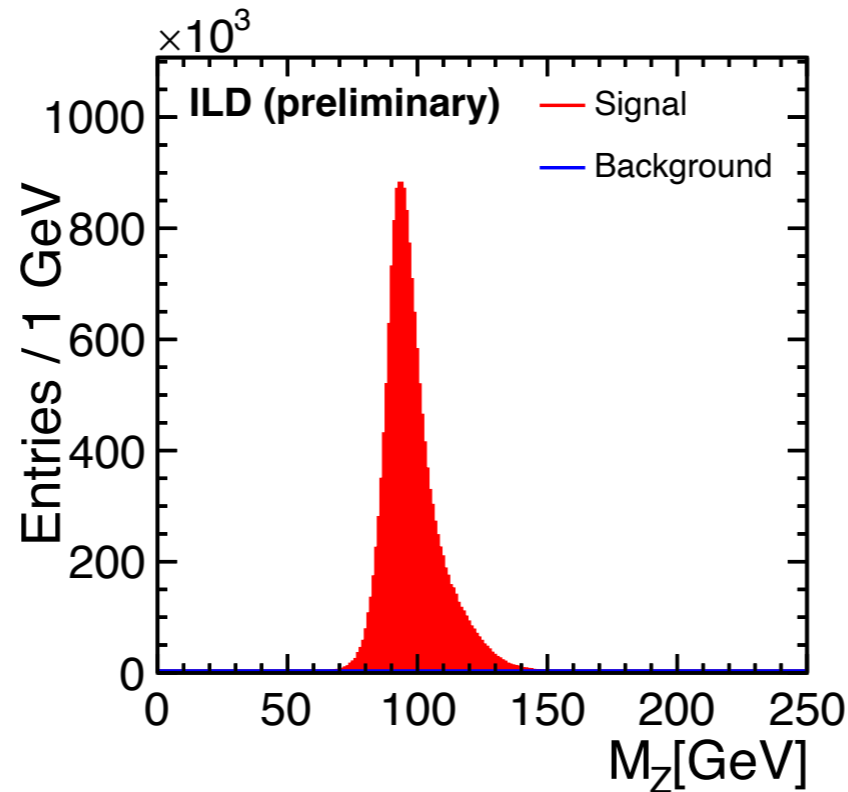
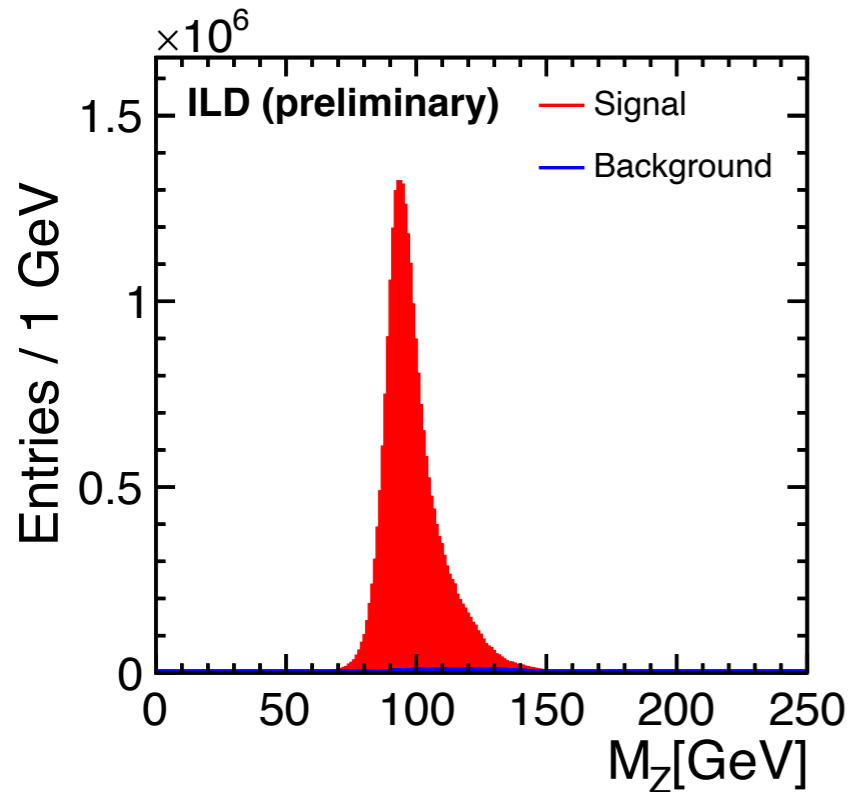
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# Background exclusion

$$(P_{e^-}, P_{e^+}) = (-0.8, +0.3)$$

$$(P_{e^-}, P_{e^+}) = (+0.8, -0.3)$$



Signal to background ratio is  
0.02151 for  $(-0.8, +0.3)$   
0.00655 for  $(+0.8, -0.3)$

# Estimation of error

$$A_{LR} = \frac{\sigma_L - \sigma_R}{\sigma_L + \sigma_R}.$$

L/R : 100% polarization

$$A_{LRobs} = \frac{\sigma_{-+} - \sigma_{+-}}{\sigma_{-+} + \sigma_{+-}}$$

-/+ : Polarization at ILC

$$A_{LR} = A_{LRobs} \frac{1 + |P_-||P_+|}{|P_-| + |P_+|} = A_{LRobs} \times f.$$

The error of the  $A_{LR}$  can be expressed as

$$\left( \frac{\Delta A_{LR}}{A_{LR}} \right)^2 = \left( \frac{\Delta A_{LRobs}}{A_{LRobs}} \right)^2 + \left( \frac{\Delta f}{f} \right)^2$$

# Estimation of error

The propagation of the error derives

$$\left(\frac{\Delta f}{f}\right)^2 = \left(\frac{|P_-|(1+|P_+|)(1-|P_+|)}{(|P_-|+|P_+|)(1+|P_-||P_+|)}\right)^2 \left(\frac{\Delta|P_-|}{|P_-|}\right)^2 + \left(\frac{|P_+|(1+|P_-|)(1-|P_-|)}{(|P_-|+|P_+|)(1+|P_-||P_+|)}\right)^2 \left(\frac{\Delta|P_+|}{|P_+|}\right)^2$$

As for the error of  $A_{LRobs}$ , defining

$$N_{-+} = \eta_{-+} L_{-+} \sigma_{-+} \quad \alpha = L_{-+} \eta_{-+}$$

$\eta$ : detector acceptance

$$N_{+-} = \eta_{+-} L_{+-} \sigma_{+-}, \quad \beta = L_{+-} \eta_{+-},$$

L: integrated luminosity

$$A_{LRobs} = \frac{\frac{N_{-+}}{\alpha} - \frac{N_{+-}}{\beta}}{\frac{N_{-+}}{\alpha} + \frac{N_{+-}}{\beta}},$$

$$\left(\frac{\Delta A_{LRobs}}{A_{LRobs}}\right)^2 = \left(\frac{2 \left(\frac{N_{-+}}{\alpha}\right) \left(\frac{N_{+-}}{\beta}\right)}{\left(\frac{N_{-+}}{\alpha} - \frac{N_{+-}}{\beta}\right) \left(\frac{N_{-+}}{\alpha} + \frac{N_{+-}}{\beta}\right)}\right)^2 \left( \left(\frac{\Delta\alpha}{\alpha}\right)^2 + \left(\frac{\Delta\beta}{\beta}\right)^2 + \left(\frac{\Delta N_{-+}}{N_{-+}}\right)^2 + \left(\frac{\Delta N_{+-}}{N_{+-}}\right)^2 \right)$$



# Results

Assuming that errors of  $\eta$  and  $L$  are negligible,

$$A_{LR} = 0.22820 \pm 0.00017$$

$$\text{Relative error} = 0.000764$$

Assuming that  $f/\Delta f = 0.001$ .

In the case  $\alpha/\Delta\alpha = \beta/\Delta\beta = \mathbf{0.00033}$ ,

$$\text{Relative error} = 0.001448$$

10 times better than the relative error at SLC = 0.014501

$\alpha$  and  $\beta$  are correlated and correlation parts cancel out.

Relative error in the non-correlation part should be 0.00033.