(Preliminary consideration on) a_μ^{HLO} from spacelike data in e-e- collider

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a_μ^{HLO} calculation:

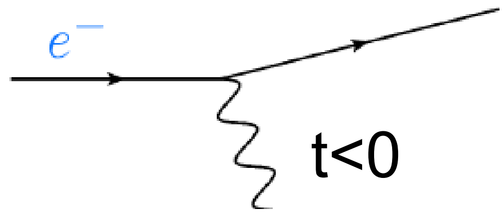
Traditional way (timelike data):

$$a_\mu^{had.} = -\frac{\alpha}{\pi^2}\int_0^\infty \frac{ds}{s} K(s)\,\mathrm{Im}\,\Pi(s)dx$$

Alternative formula for spacelike region:

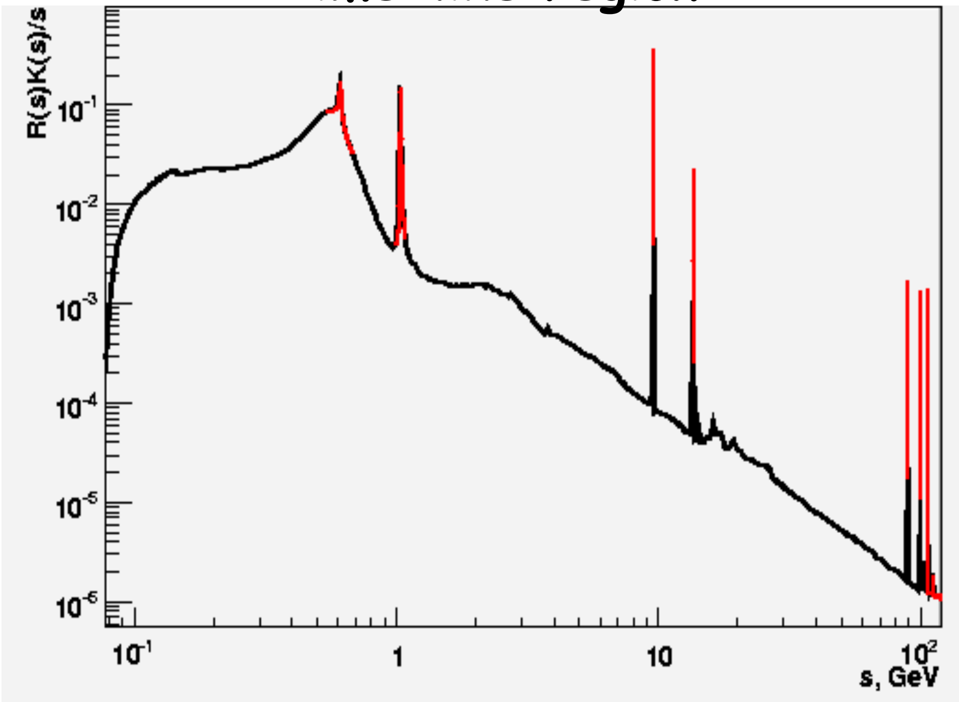
$$a_\mu^{had.} = \frac{\alpha}{\pi}\int_0^1 (1-x)\Pi\left(-\frac{x^2}{1-x}m_\mu^2\right)dx$$

$$x = \frac{t}{2m_\mu^2}\left(1-\sqrt{1-\frac{4m^2}{t}}\right)$$

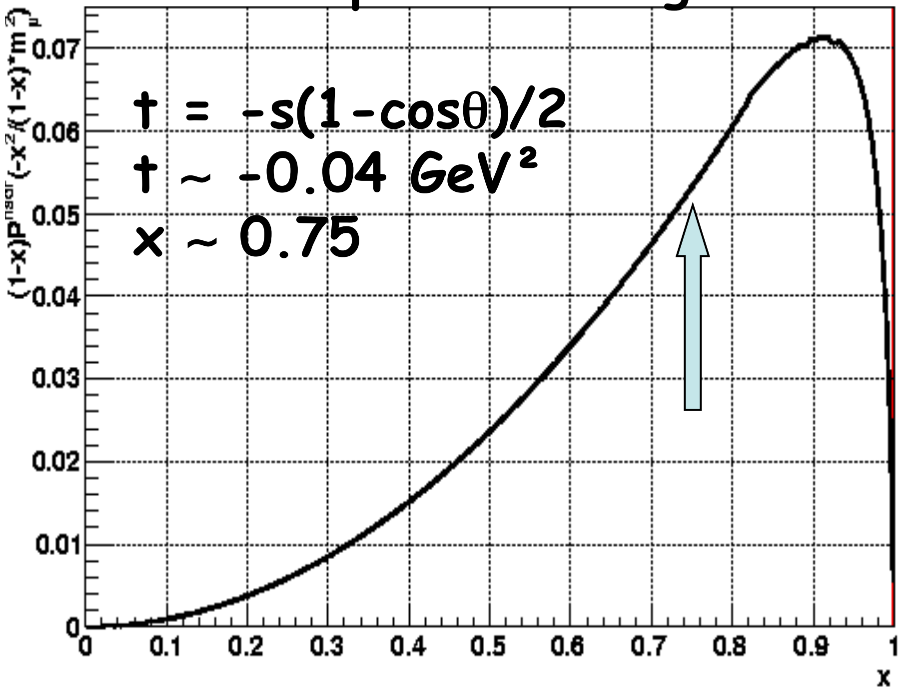


Contribution to a_μ^{HLO}

Time-like region



Space-like region



Red lines – resonance contributions

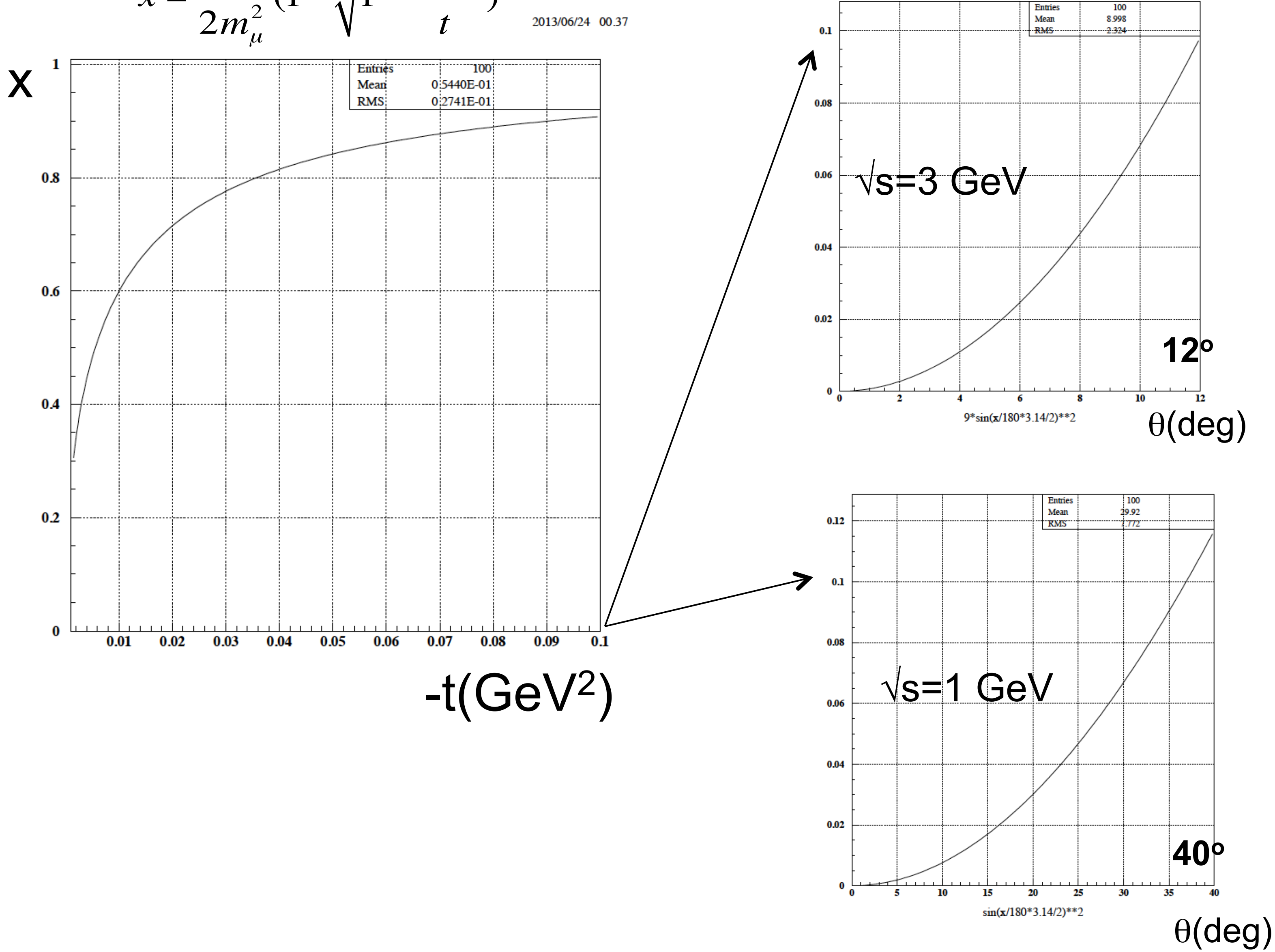
ee→ ee process to extract $\Pi(-q^2)$ from t-channel in space-like region (accuracy <0.1%)

For e^-e^- no s-channel “background”!

Which is the best energy/angle configuration?

$$-t = 9(1-\cos\theta)/2$$

$$x = \frac{t}{2m_\mu^2}\left(1-\sqrt{1-\frac{4m^2}{t}}\right)$$



Conclusion

- An alternative formula for a_μ^{HLO} in spacelike region
- $\Pi(-q^2)$ from t-channel in space-like region can be obtained by $ee \to ee$ process
- e^-e^- has not the s-channel "background"
- e^-e^- at $\sqrt{s}$~1 GeV (with θ<40^o) or at 3 GeV (with θ<12^o) looks a possible configuration

- Luminosity shouldn't be a problem
- Normalization?
- Background?
- RC?
- Ultimate precision (0.1%)?

Work in progress….