Weekly

Maosen Zhou

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Fake factor

- to derive fake factor:

$$\theta_e(\leq 2\text{jets}) = \frac{N_{ee}^{\text{data}} - N_{ee}^{\text{prompt SS}} - N_{ee}^{\text{QmisID}}}{N_{e\not{e}}^{\text{data}} - N_{e\not{e}}^{\text{prompt SS}} - N_{e\not{e}}^{\text{QmisID MC}}}(\leq 2\text{jets})$$

$$\theta_\mu(\leq 2\text{jets}) = \frac{N_{\mu\mu}^{\text{data}} - N_{\mu\mu}^{\text{prompt SS}}}{N_{\mu\not{\mu}}^{\text{data}} - N_{\mu\not{\mu}}^{\text{prompt SS}}}(\leq 2\text{jets})$$

- to apply fake factor:

$$N_{ee}^{\text{fakes}}(\geq 3\text{jets}) = (N_{e\not{e}}^{\text{data}} - N_{e\not{e}}^{\text{prompt SS}} - N_{e\not{e}}^{\text{QmisID MC}})(\geq 3\text{jets}) \times \theta_e \quad (4)$$

$$N_{\mu\mu}^{\text{fakes}}(\geq 3\text{jets}) = (N_{\mu\not{\mu}}^{\text{data}} - N_{\mu\not{\mu}}^{\text{prompt SS}})(\geq 3\text{jets}) \times \theta_\mu \quad (5)$$

$$N_{e\mu}^{\text{fakes}}(\geq 3\text{jets}) = (N_{e\not{\mu}} - N_{e\not{\mu}}^{\text{prompt SS}} - N_{e\not{\mu}}^{\text{QmisID}})(\geq 3\text{jets}) \times \theta_\mu + (N_{\not{e}\mu} - N_{\not{e}\mu}^{\text{prompt SS}} - N_{\not{e}\mu}^{\text{QmisID MC}})(\geq 3\text{jets}) \times \theta_e$$

- In principle, we should divide into two categories:
  - pt(anti-lepton)>pt(id-lepton) in denominator, tag pt/eta of leading lepton in nominator;
  - pt(anti-lepton)<pt(id-lepton) in denominator, tag pt/eta of sub lepton in nominator;
- But the problem: which fake factor to use in emu channel;

Solutions

	e + antiid e	mu + antiid mu
pt(antiid lep)<pt(lep)	2/3	1
pt(antiid lep)>pt(lep)	1/3	~0

- So it's safe to always tag sub leading muon in nominator when calculating fake factor of muon; then derive fake factor of electron in emu channel, to avoid the problem;

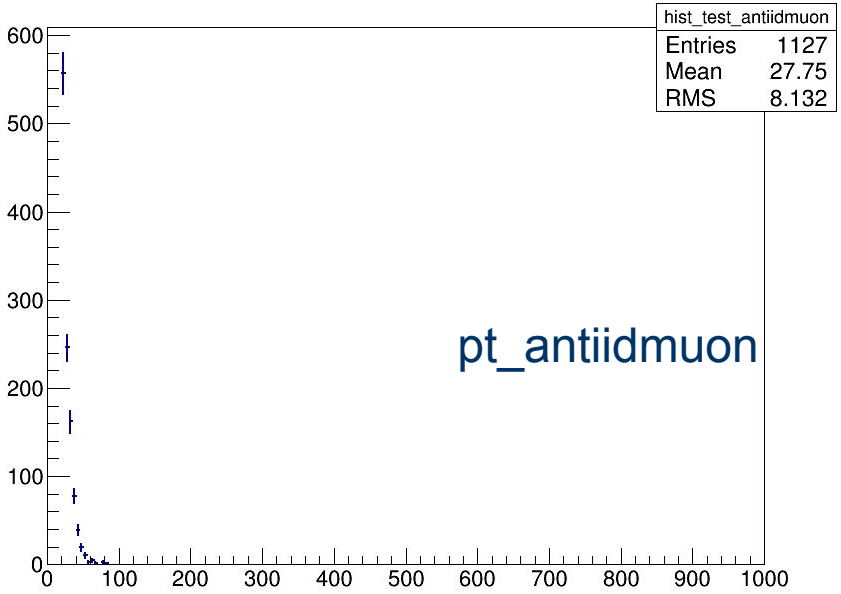
$$\theta_e = \frac{N_{\mu e}}{N_{\mu \not{e}}}(\leq 2 jets) = \frac{N_{\mu e}^{Data} - N_{\mu e}^{Prompt\ SS} - N_{\mu e}^{QMisId} - N_{\mu e}^{FakeMuon}}{N_{\mu \not{e}}^{Data} - N_{\mu \not{e}}^{Prompt\ SS} - N_{\mu \not{e}}^{QMisId}}$$

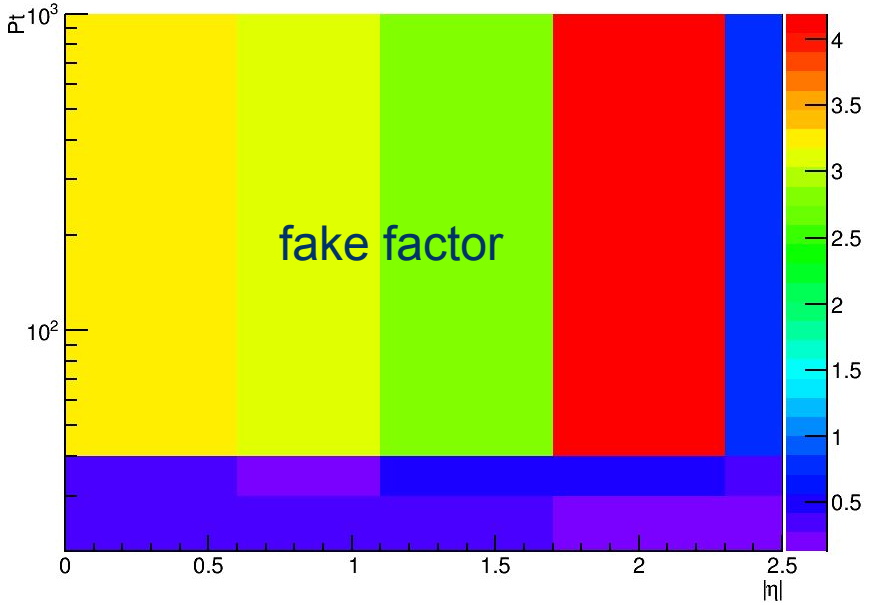
$$\theta_\mu = \frac{N_{\mu\mu}}{N_{\mu \not{\mu}}}(\leq 2 jets) = \frac{N_{\mu\mu}^{Data} - N_{\mu\mu}^{Prompt\ SS}}{N_{\mu \not{\mu}}^{Data} - N_{\mu \not{\mu}}^{Prompt\ SS}}$$

mumu

- Update to 2D fake factor;
- Binning:
  - eta: 0, 0.6, 1.1, 1.7, 2.30, 2.50;
  - pt: 20, 30, 40, 1000;

- Below 40 GeV, fake factor are lower than 1;
- Above 40 GeV, >1;





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