CDC hit efficiency simulation update

NSJ 24 Jan 2019

Branch nsj_cdc_spring2018

Sim: modified mcsmear to suppress CDC gain in spring 2018
- using the gain vs doca correction params in ccdb
- use amplitude correction for both amplitude and charge

Recon: modified PID/DParticleID.cc to use amplitude correction if a=q

Recon: modified CDC_Efficiency to ignore hits without dE/dx
- (ie hits outside the max doca specified in the params)

Other requirements in CDC_Efficiency:
- vertex within target
- at least one match to TOF or BCAL
- min tracking FOM 5.7e-7 (5 sigma)
- momentum 0.5 to 6.0 GeV/c
- dE/dx < 1e3 keV/cm
- at least 2 superlayers with 2+ axial or 2+ stereo rings hit
- at least 3 rings hit per superlayer

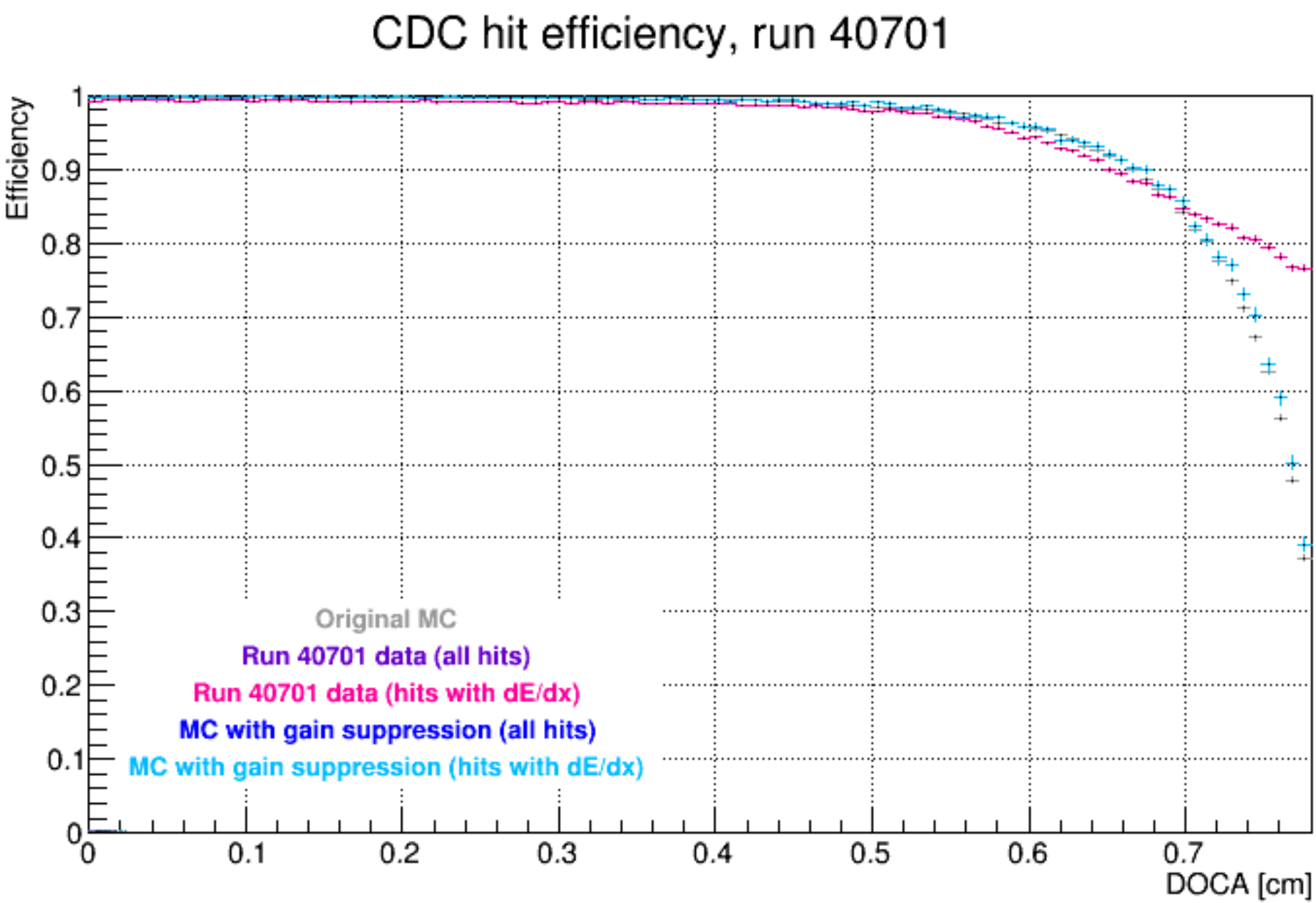
```
double d = titer->getD();

if (d > cdc_config->CDC_GAIN_DOCA_PARS[1]) {

  double reference = cdc_config->CDC_GAIN_DOCA_PARS[2] + d*cdc_config->CDC_GAIN_DOCA_PARS[3];

  double this_run = cdc_config->CDC_GAIN_DOCA_PARS[4] + d*cdc_config->CDC_GAIN_DOCA_PARS[5];

  amplitude = amplitude * this_run/reference;

}
```

halld_sim
mcsmear/CDCsmearer.cc
Scales down a & q

```
if (hit->dist < CDC_GAIN_DOCA_PARS[0]) {

  dedx.dx=dx;
  dedx.dE=hit->dE; //GeV
  dedx.dE_amp=hit->dE_amp;
  dedx.p=mom.Mag();

  // amplitude correction for doca > dcorr

  if (hit->dist > CDC_GAIN_DOCA_PARS[1]) {

    double reference = CDC_GAIN_DOCA_PARS[2] + hit->dist*CDC_GAIN_DOCA_PARS[3];

    double this_run = CDC_GAIN_DOCA_PARS[4] + hit->dist*CDC_GAIN_DOCA_PARS[5];

    dedx.dE_amp = dedx.dE_amp * reference/this_run;

  }
```

halld_recon
libraries/PID/DParticleID.cc

Ignores hits outside dmax
Scales a & q up



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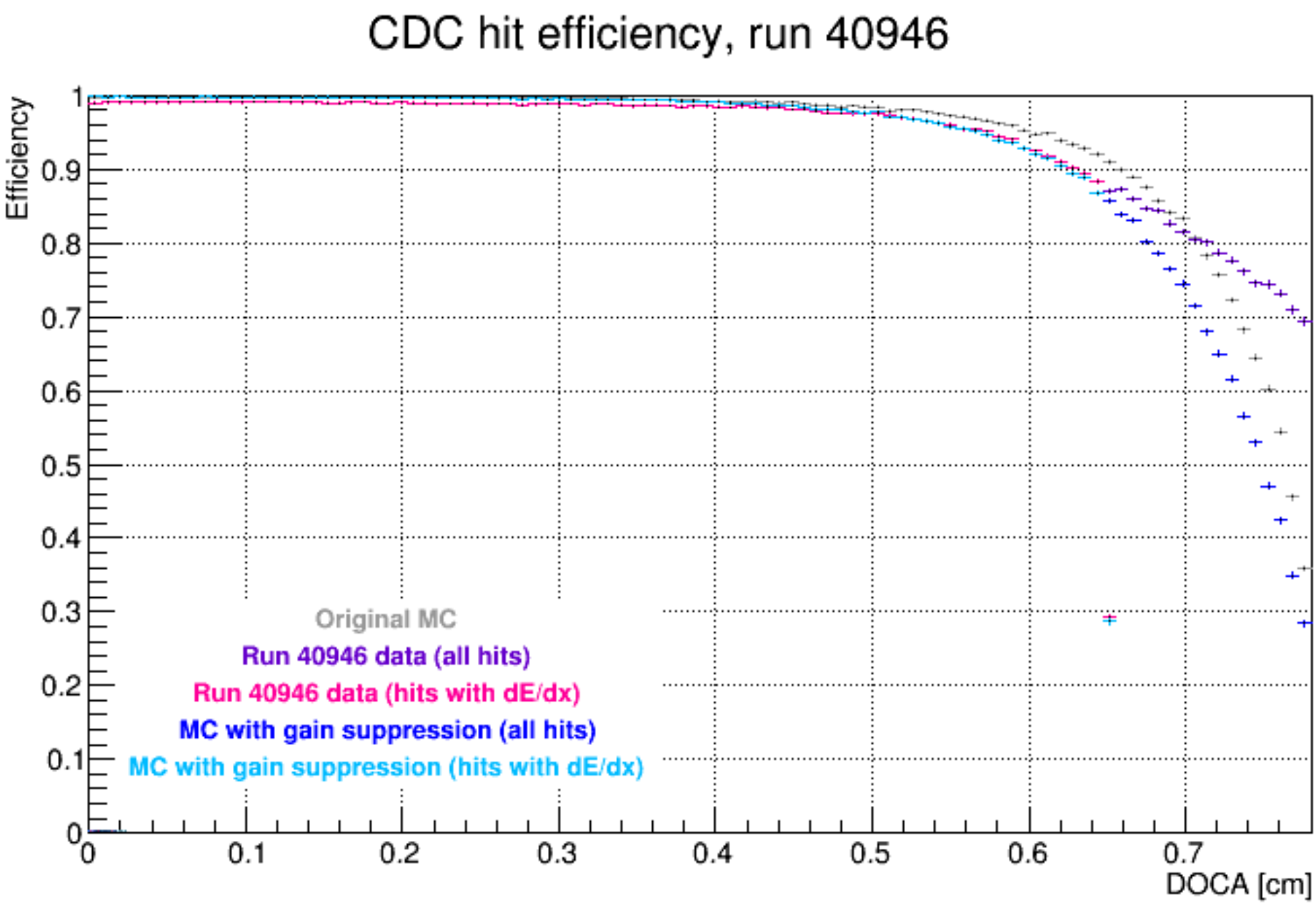

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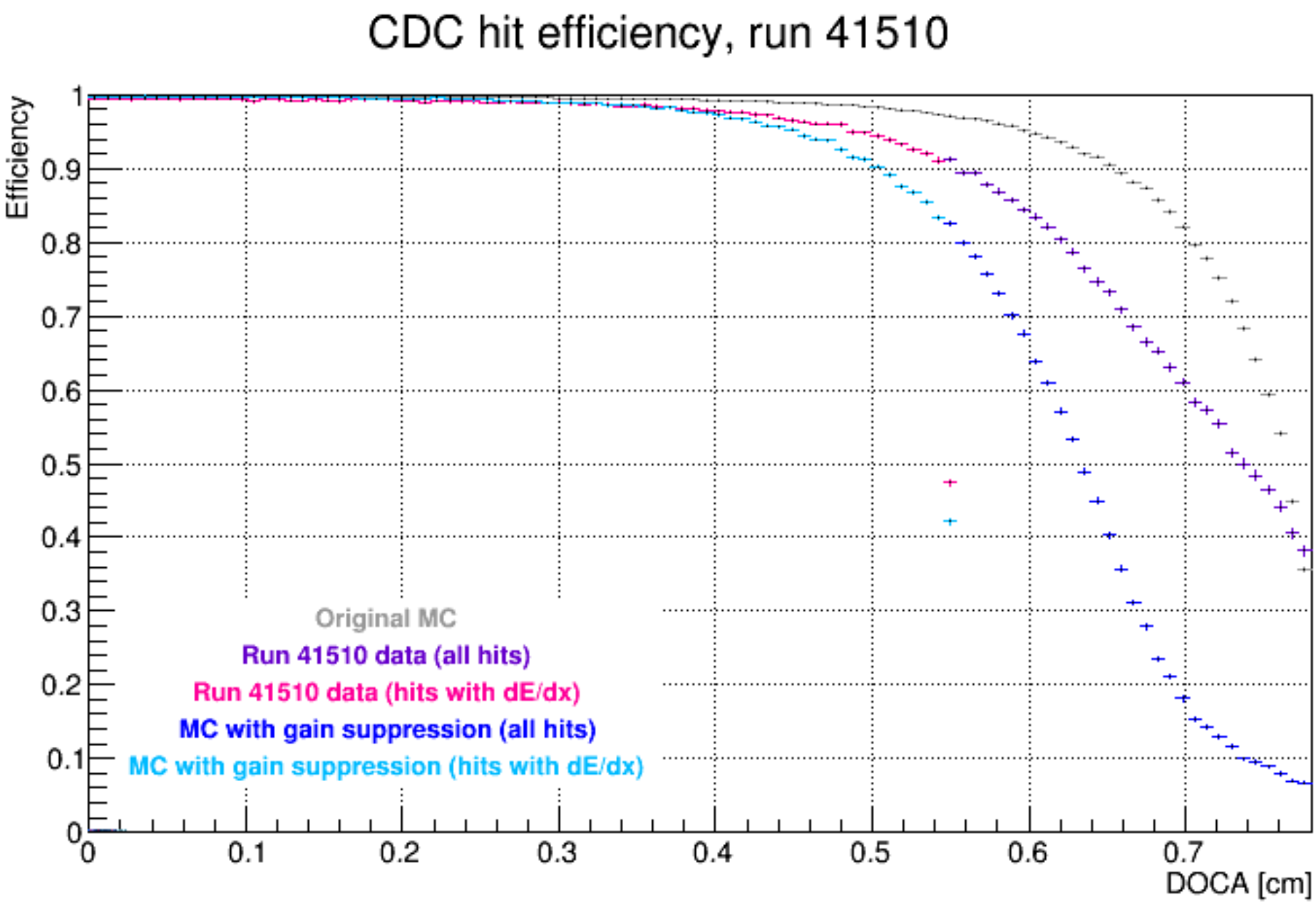

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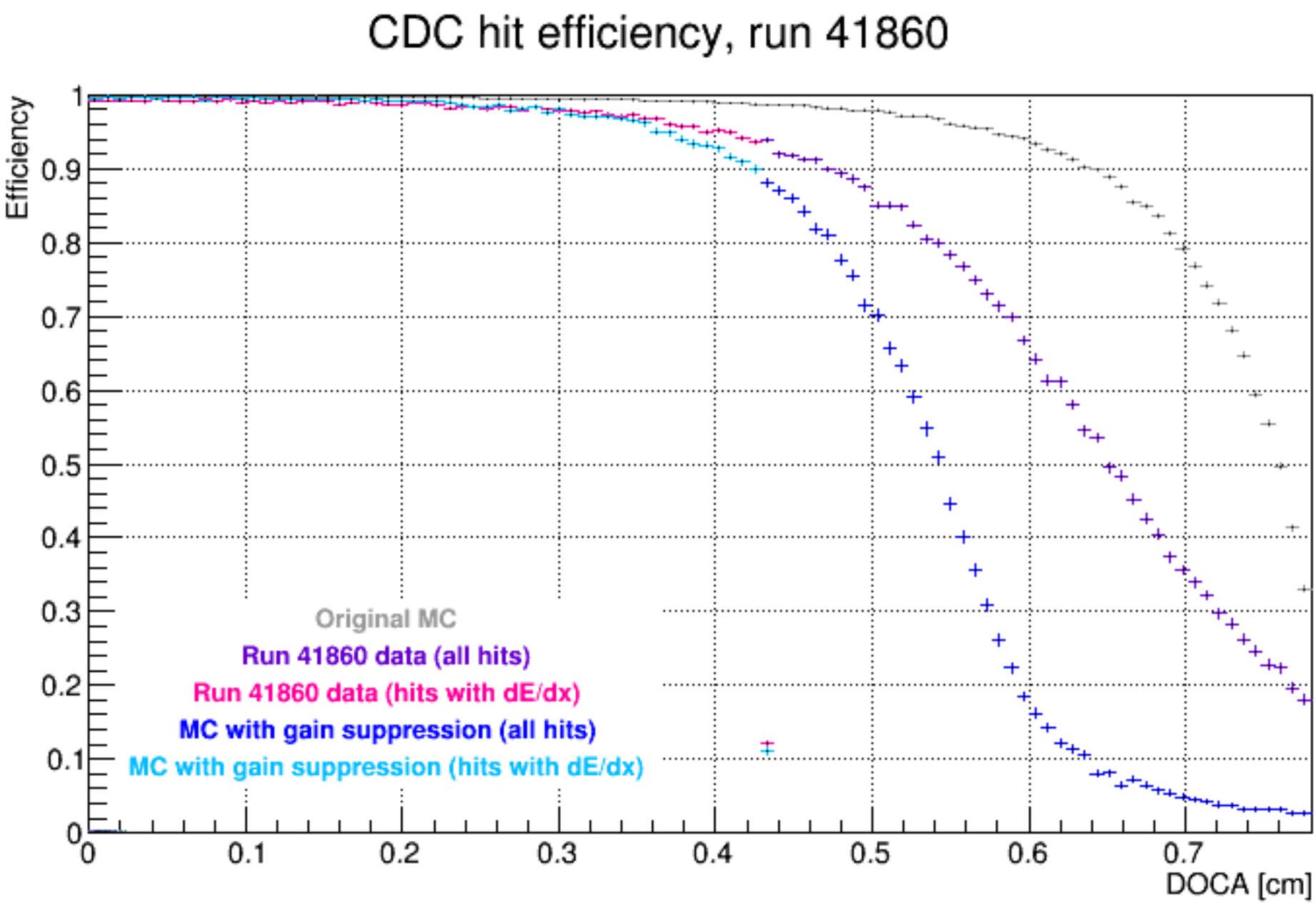

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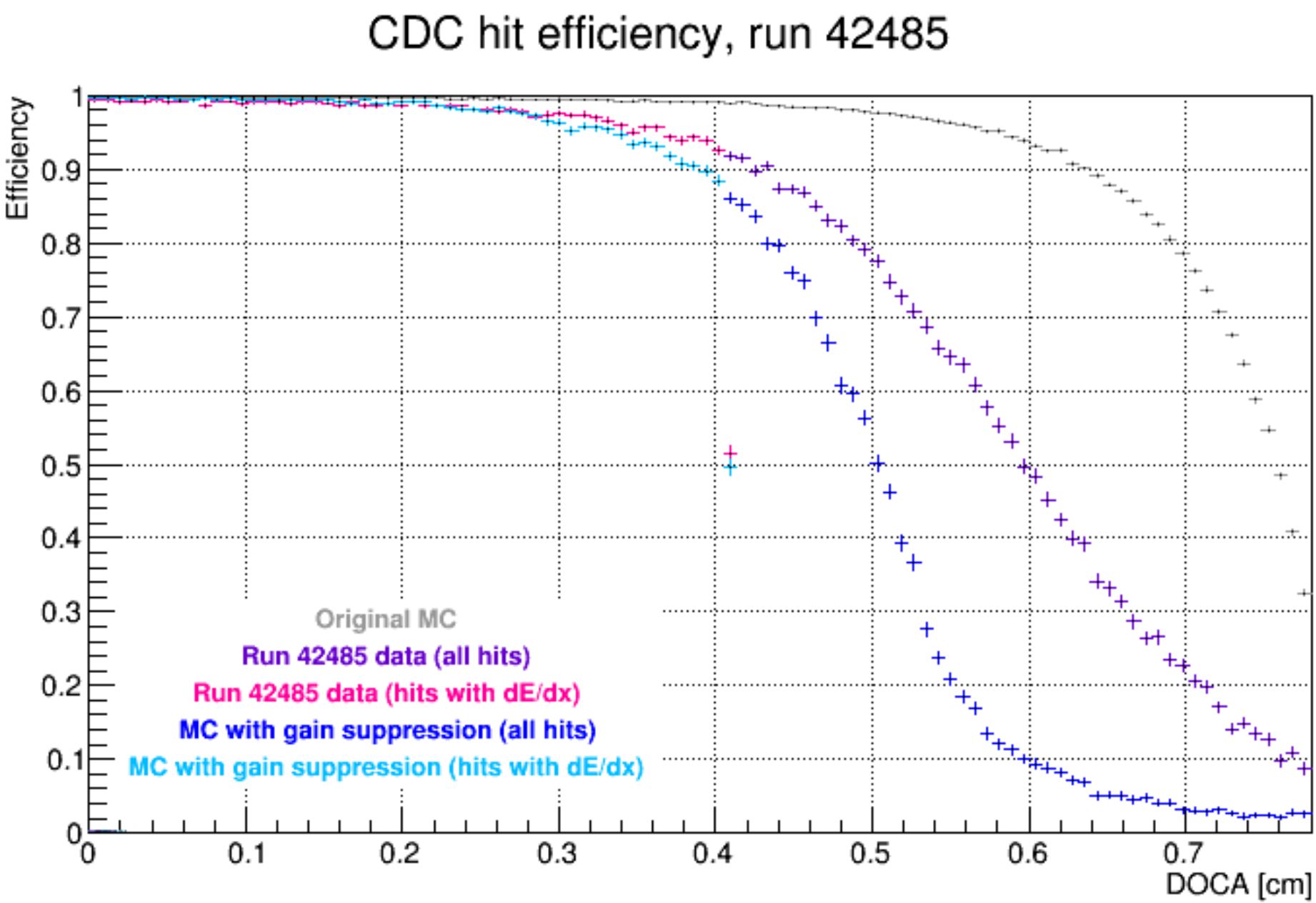

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