FSD simulation

Radim Dvořák
FNSPE CTU

Add info in sim particles

- Now we can select only particles which track has FSD point

- Weight to QN can be Q^2

```
track.SetMomentum(mctrack->GetPx(), mctrack->GetPy(), mctrack->GetPz());
track.SetMass(float(mctrack->GetMass()));
track.SetPid(int(mctrack->GetPdgCode()));
track.SetField(int(mctrack->GetGeantProcessId()), igeant_id_);
track.SetField(int(mctrack->GetNPoints(ECbmModuleId::kMvd)), in_hits_);
track.SetField(int(mctrack->GetNPoints(ECbmModuleId::kSts)), in_hits_ + 1);
track.SetField(int(mctrack->GetNPoints(ECbmModuleId::kTrd)), in_hits_ + 2);
track.SetField(int(mctrack->GetUniqueID()), icbm_id_);
track.SetField(float(mctrack->GetCharge()*mctrack->GetCharge()), icharge2_);
track.SetField(int(mctrack->GetNPoints(ECbmModuleId::kFsd)), in_points_fsd_);
```

QN - N points FSD > 1 (hole r = 5 cm)

- Calculated from all simulated particles (primary + secondary) which leave hit in FSD

- Results compared to ones calculated from FSD hits

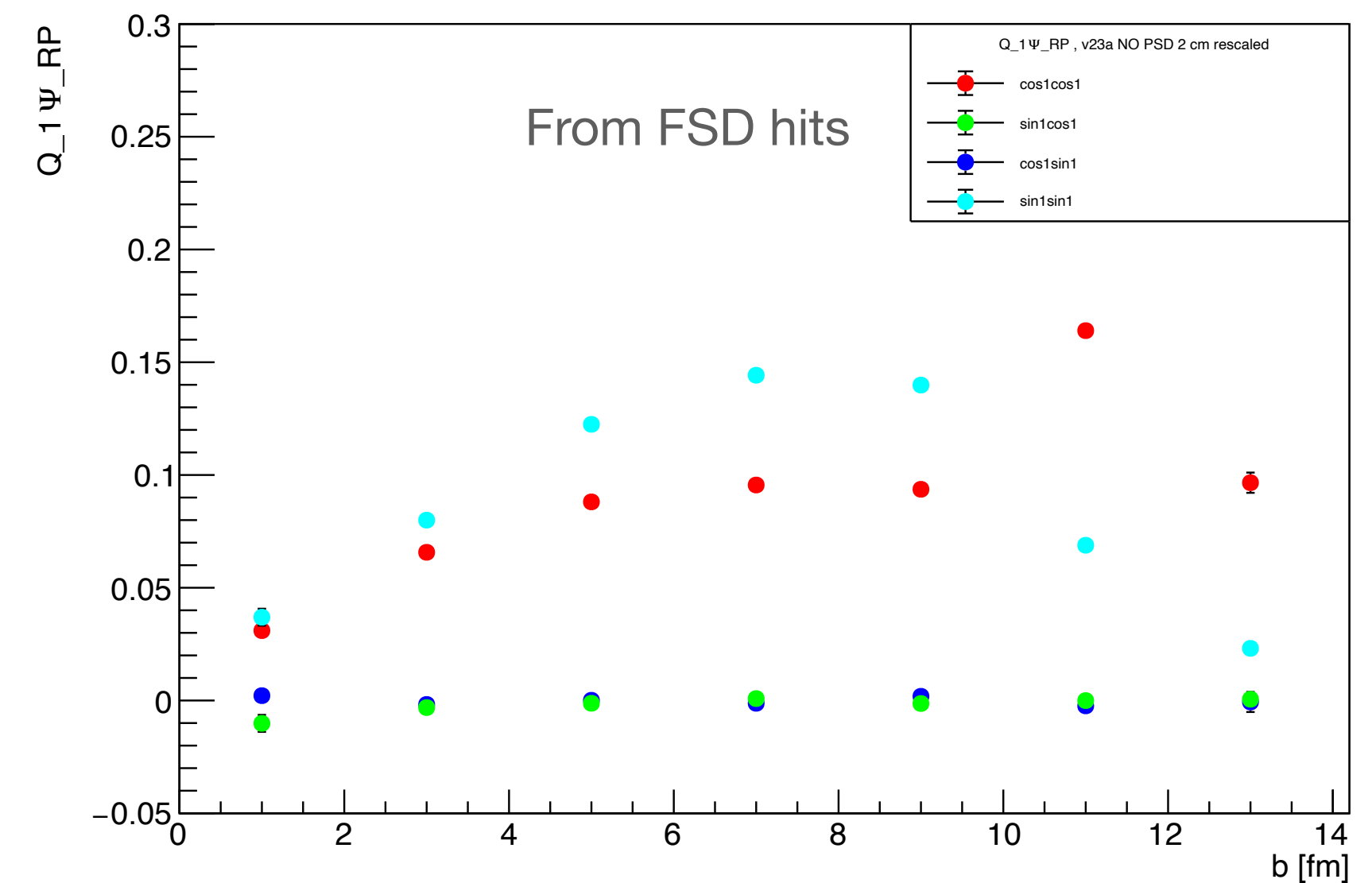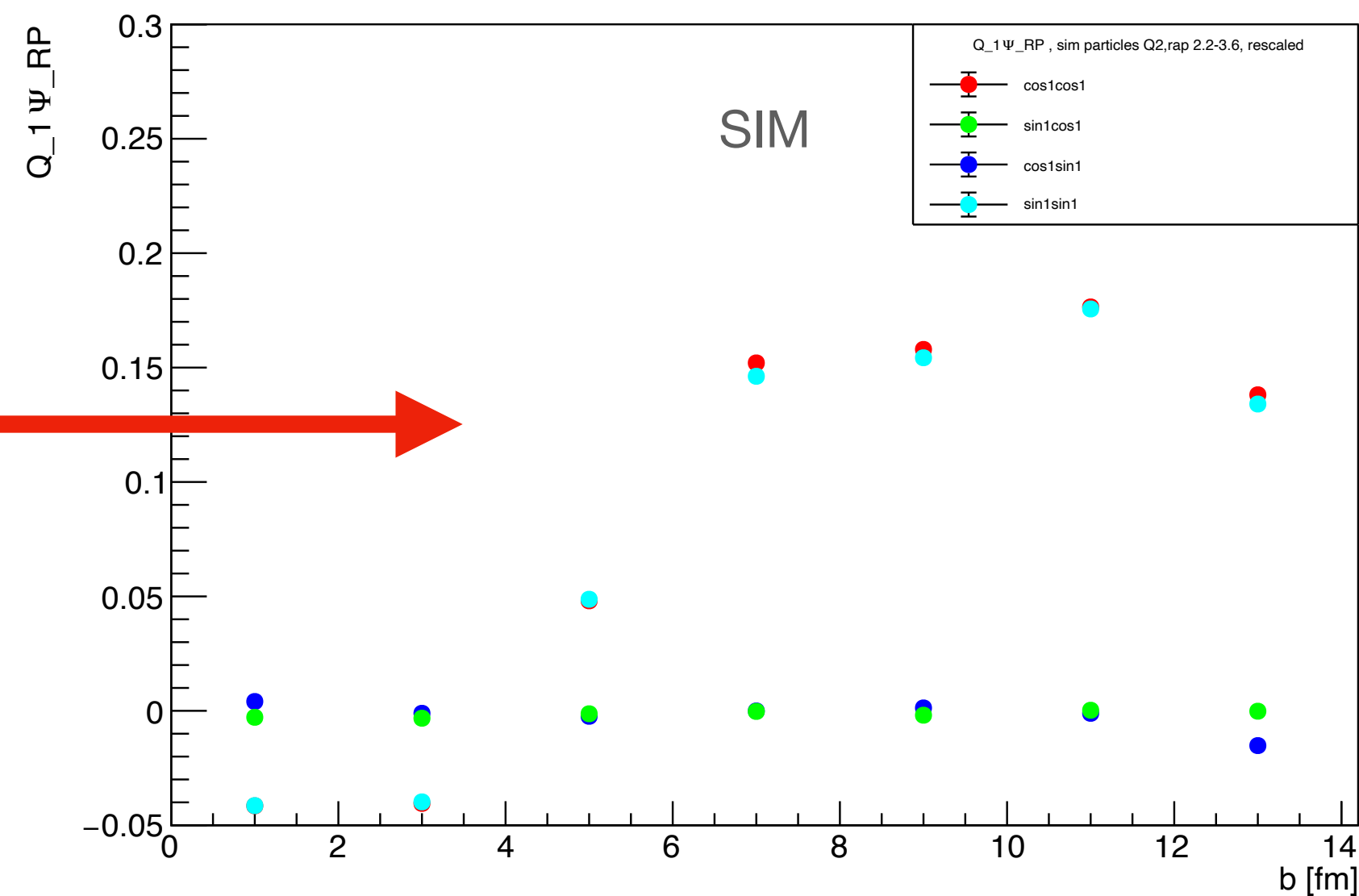- High weight of low energy secondary electrons
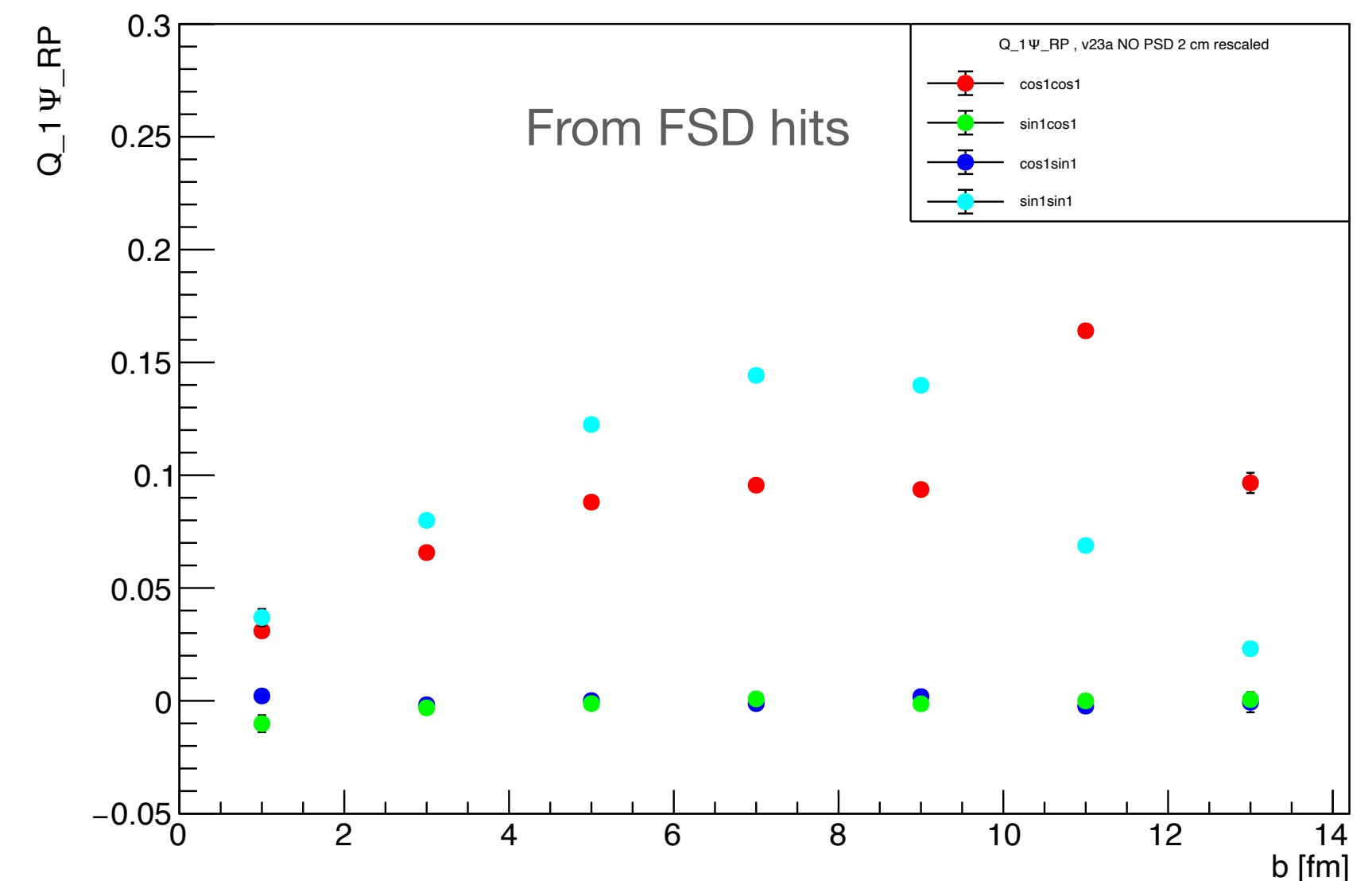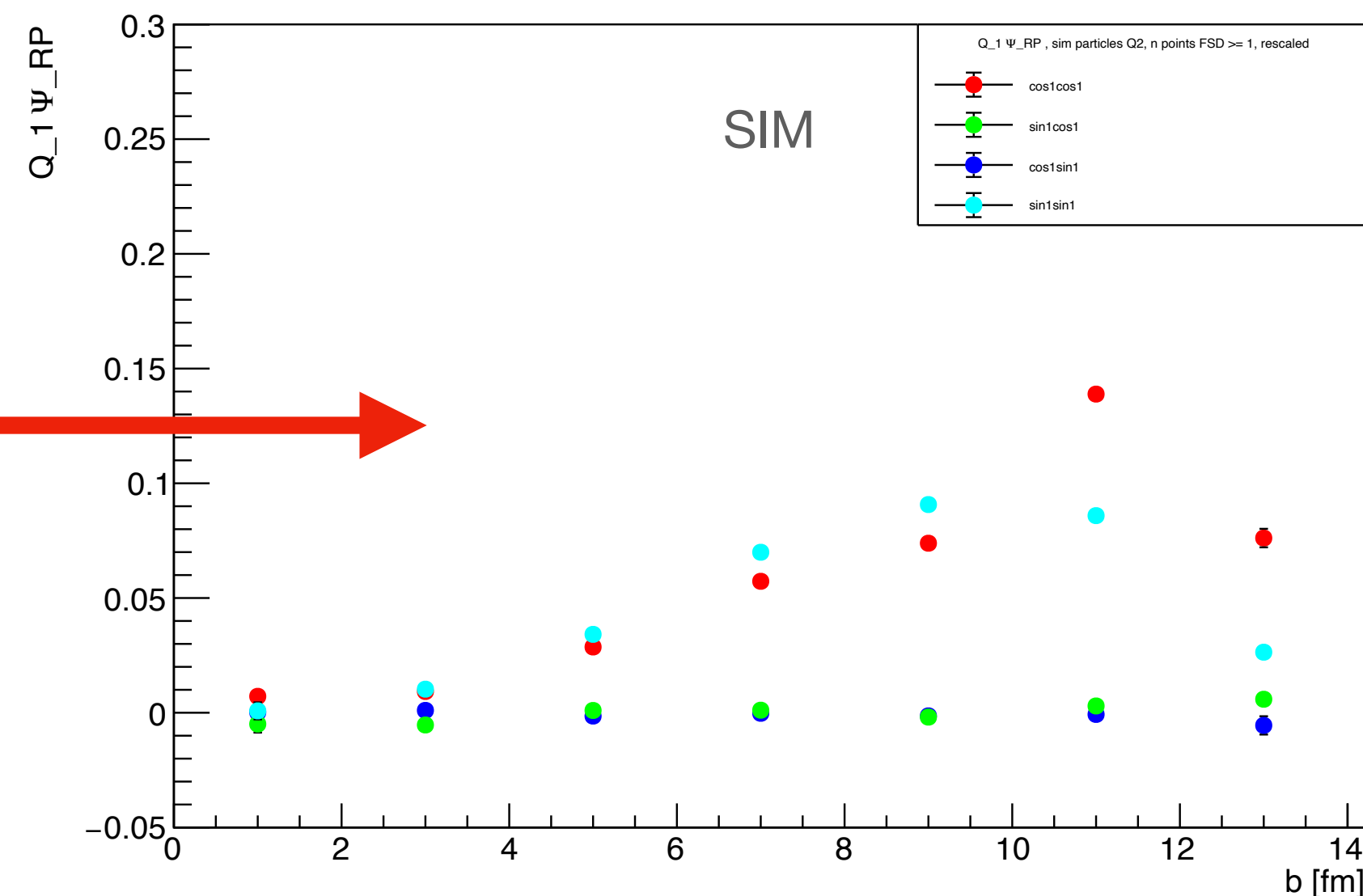
QN - rapidity cut

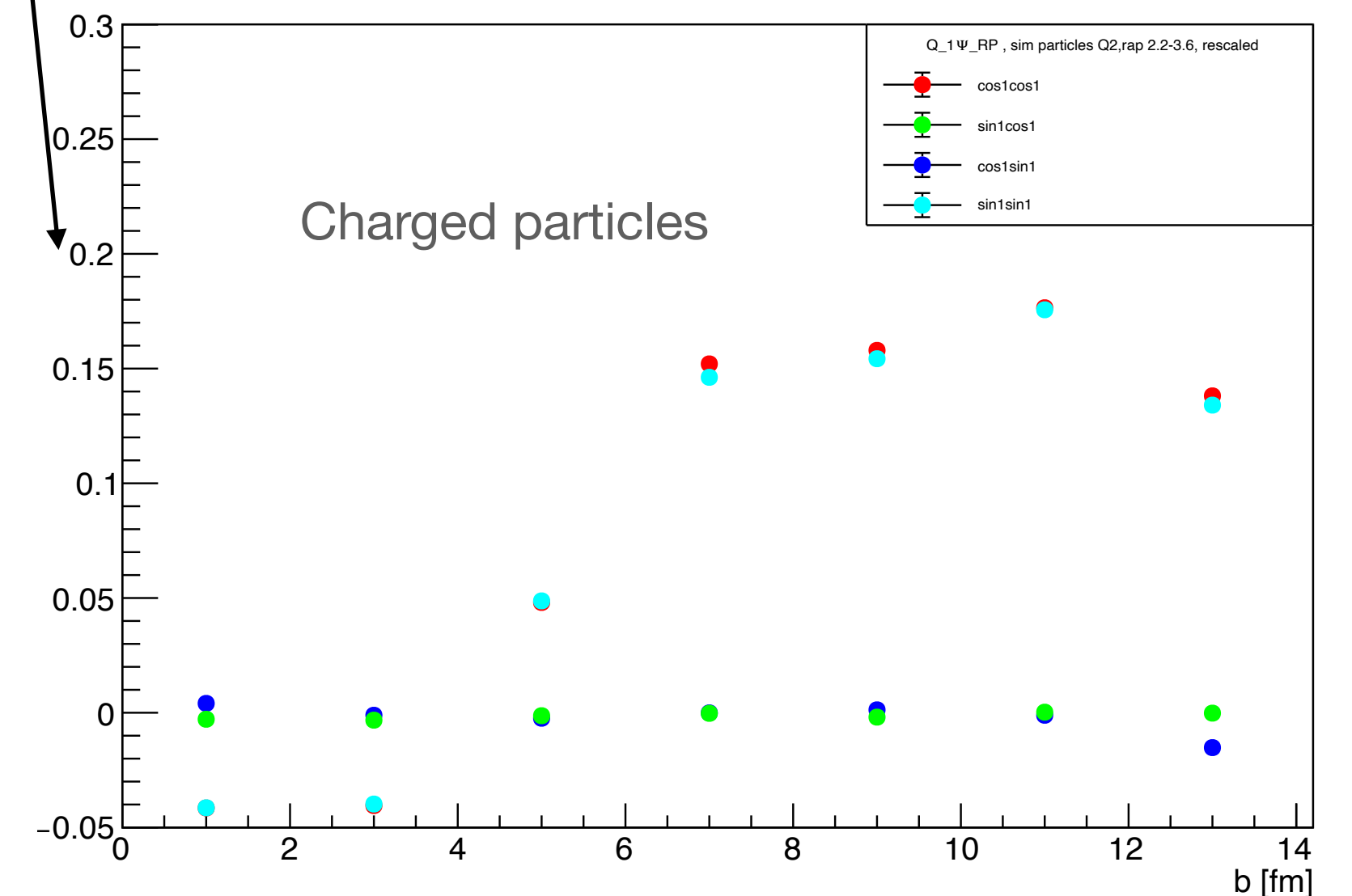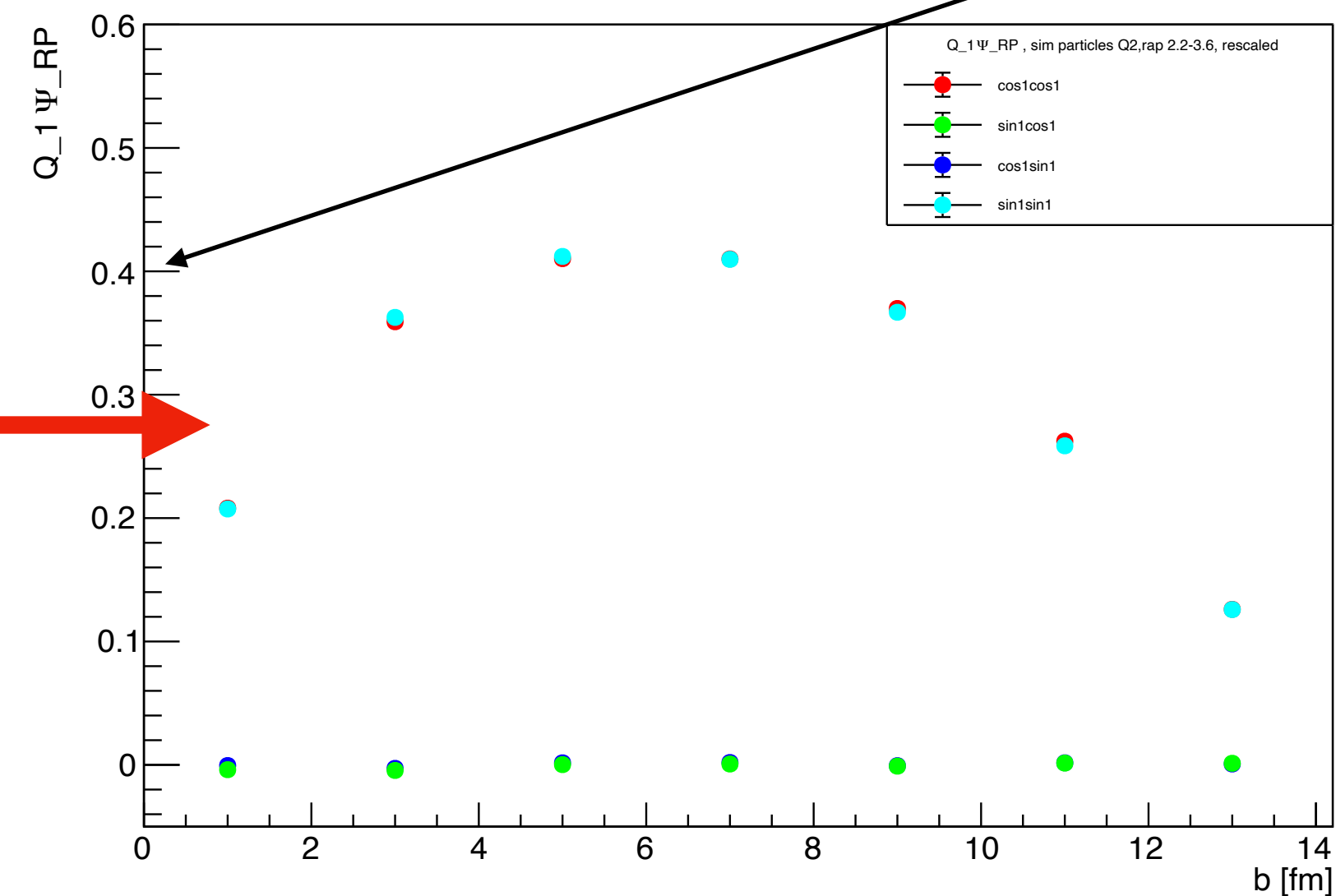- Rapidity cut - 2.2 - 3.6 - on sim particles + weight Q2 (neutrons has zero contribution)

QN - neutron cut

- Only neutrons in rapidity 2.2-3.6

- Neutron cause main part of correlation

Matching problem - CbmFsdHitConvertor

- I found that only one point is added to hit -> but in convertor there is loop over all points -> only "last" (not in time order but index order) is added to hit -> it can be some secondary electron -> cuts on points (like point lenght) doesn't make a sense

- Solution: I scan all the points and add point with highest pz (we can discuss better solution)

- It solve the problem with high momentum in creation vertex and small in psd

- This is only problem of matching hits and points but matching between hits and sim particles is correct
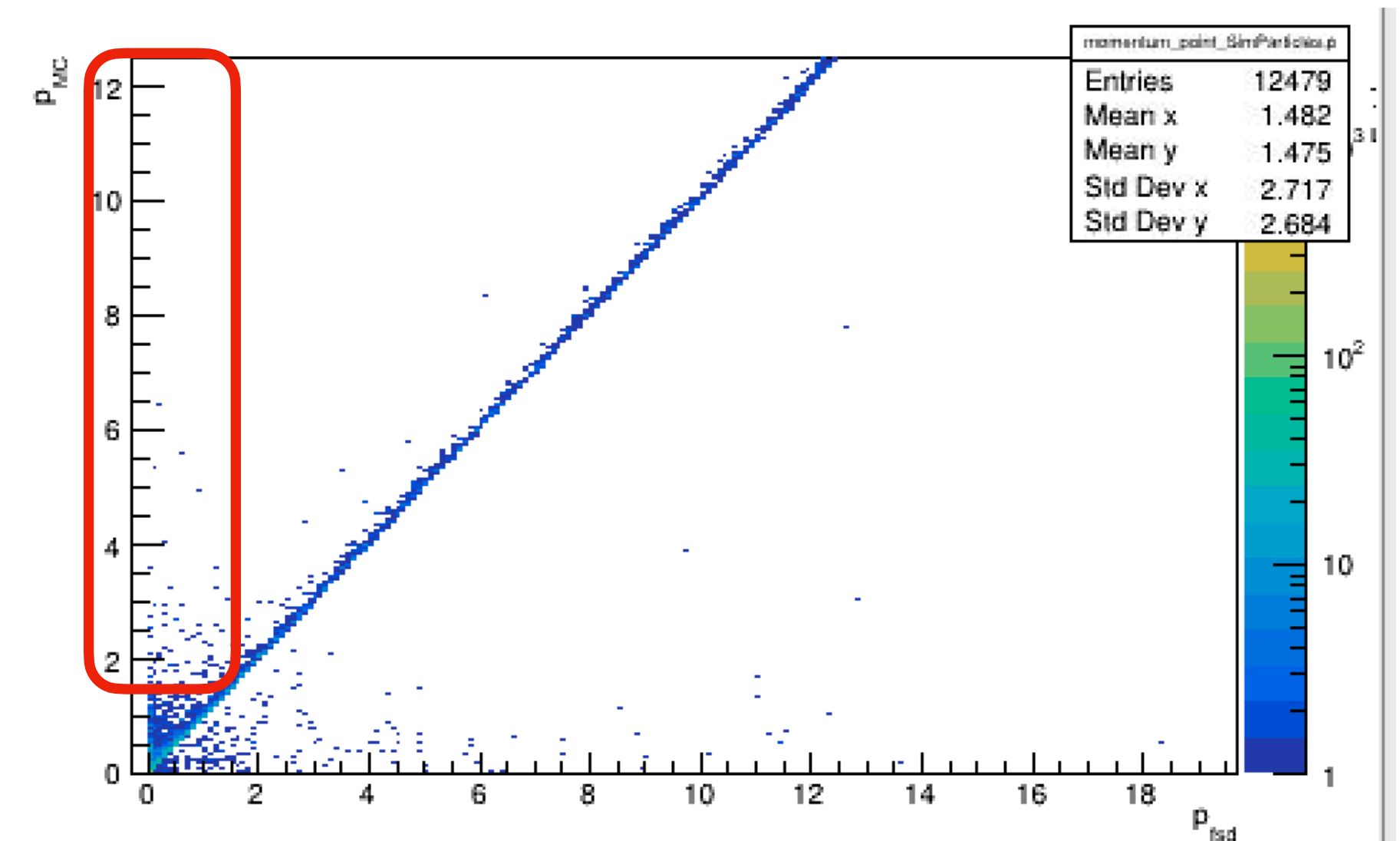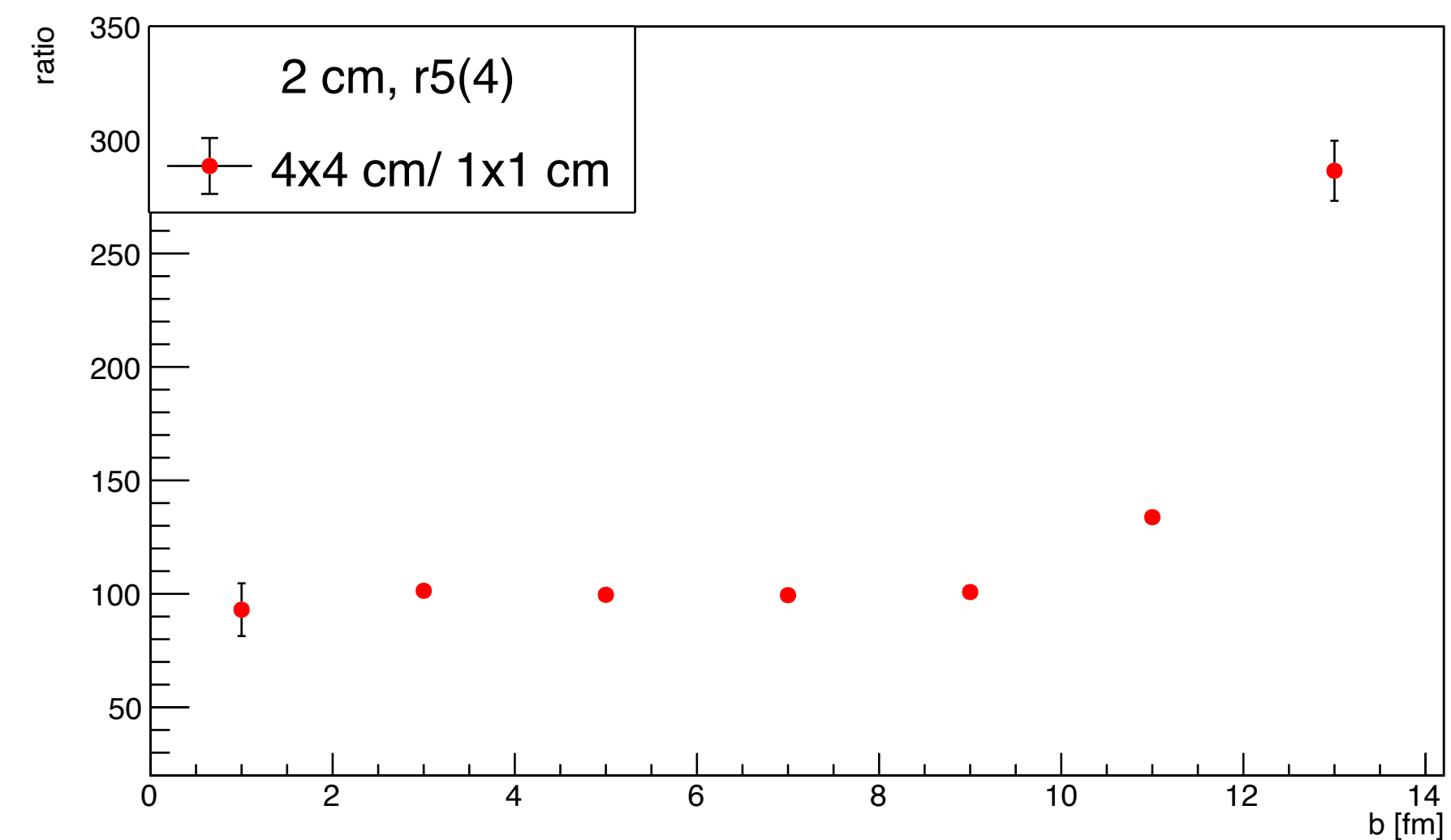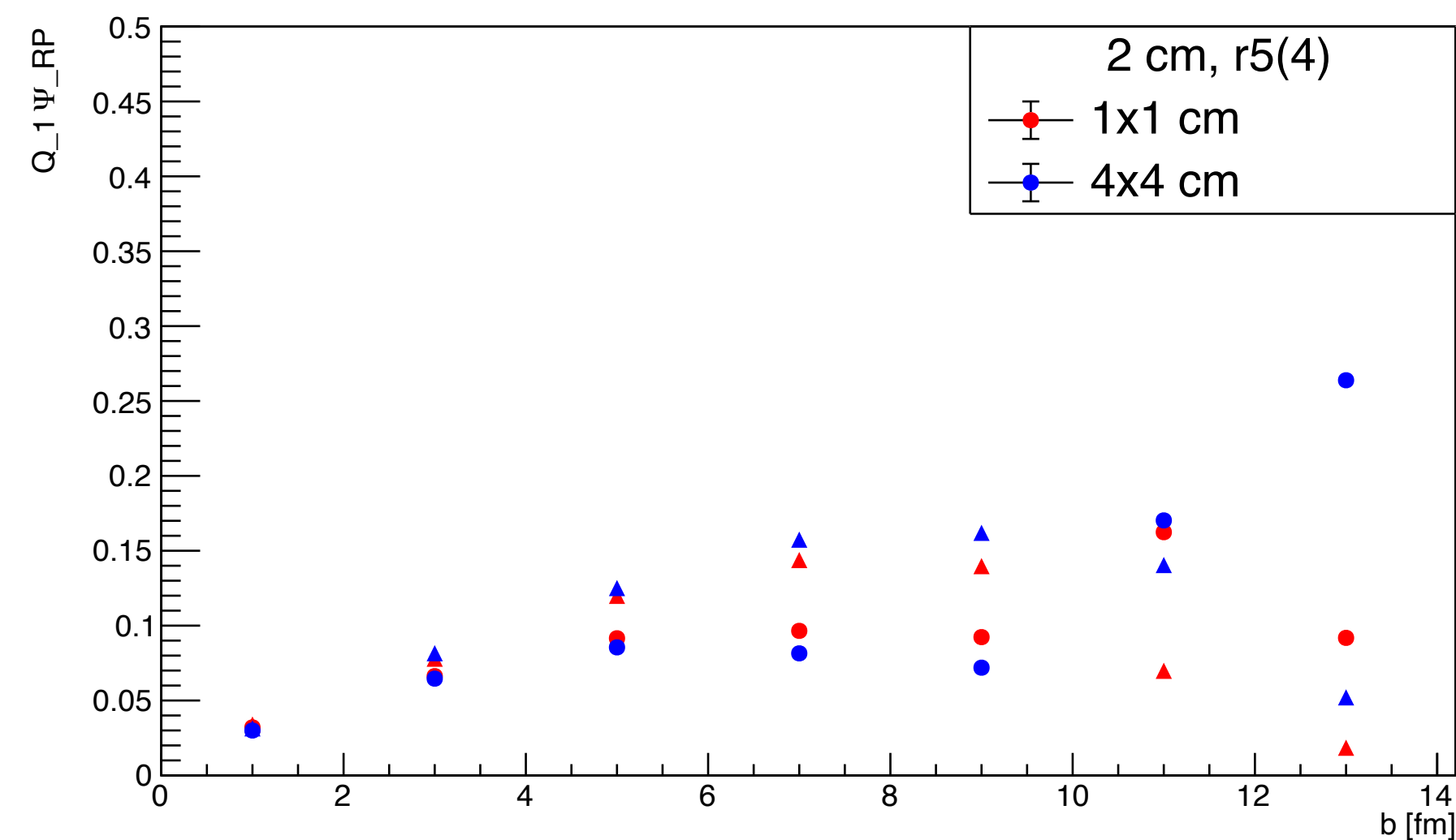
Different hole size

- FSD 2 cm 1x1 cm, hole radius 5 cm

- Cut on hole radius

  - 10 cm (circle with 10 cm radius)

  - 15 cm

- Similar results 10-15 cm hole (5% decrease)
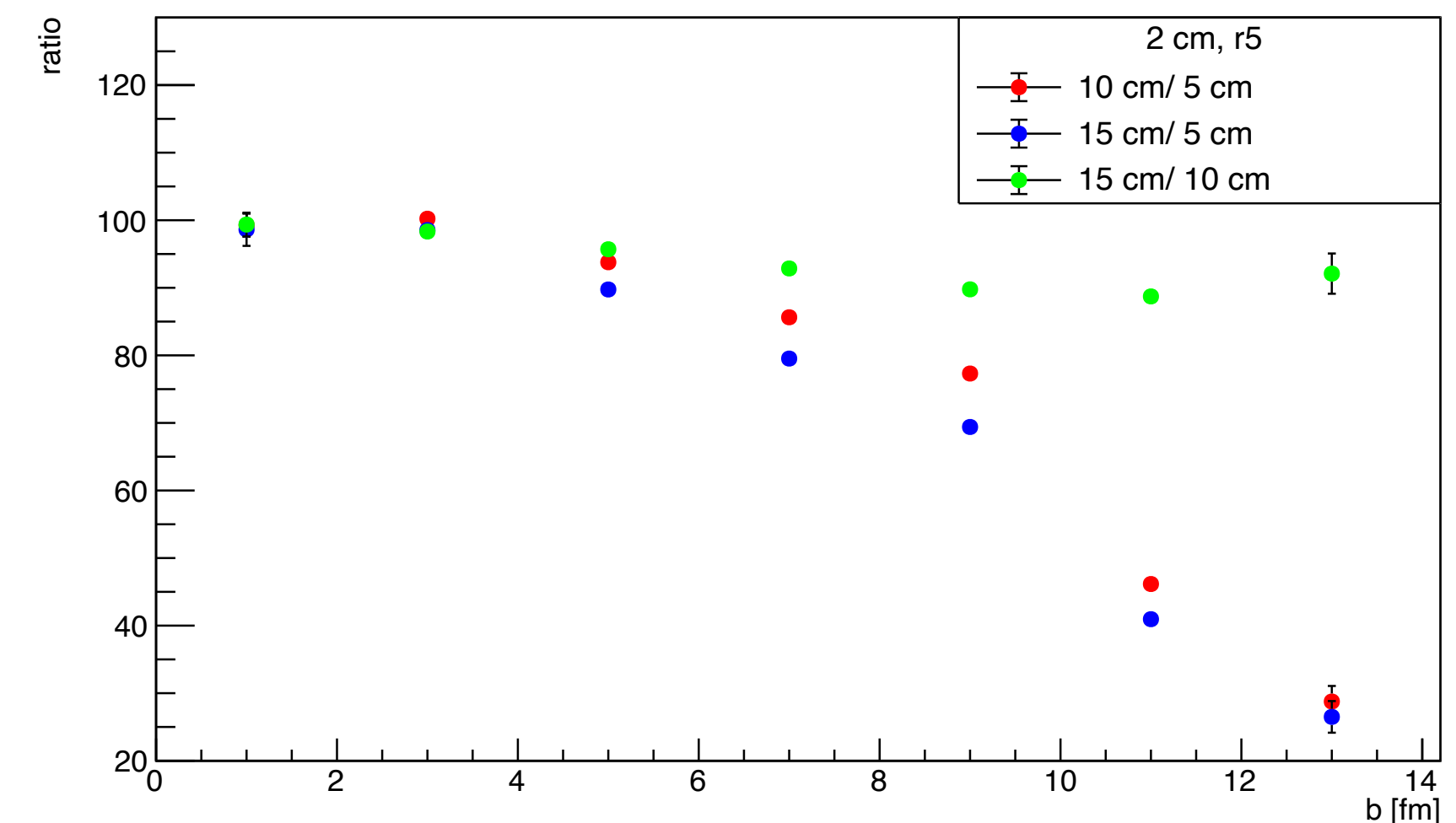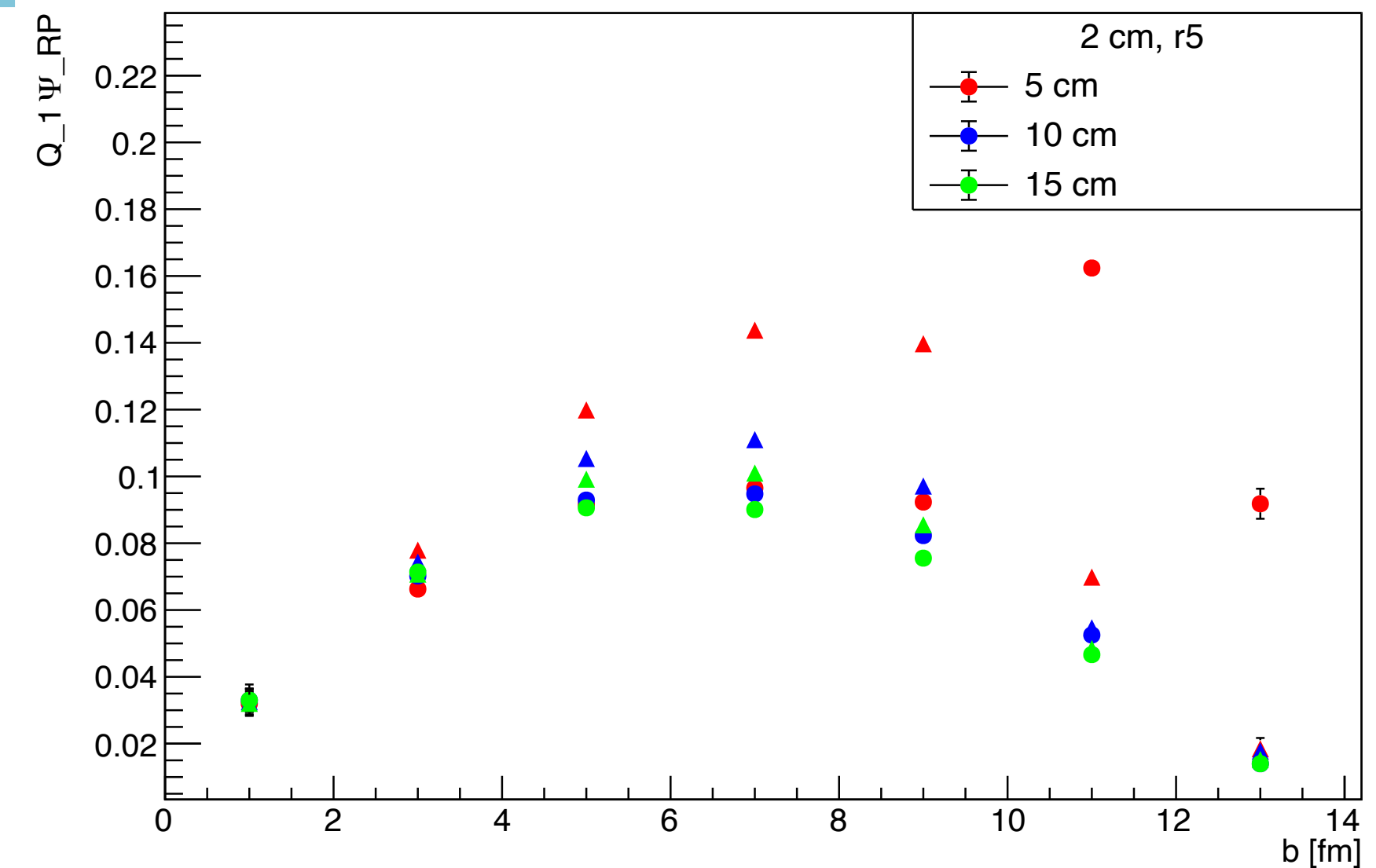
Different granularity

- 1x1 cm with hole radius 5 cm

- 4x4 cm with hole radius 4 cm

- Similar results (b < 10 fm)

Different granularity - larger hole

- Hole radius > 10 cm

- Solved problem with high b

- Granularity 4 cm has better results??? -> we are ok with 4x4 cm pads