$$\sum_i \frac{(N^{\alpha+} + N^{\alpha-})(\epsilon_{ji\,+ee}^{bac\;DT\;\alpha} + \epsilon_{ji\,-ee}^{bac\;DT\;\alpha})}{2(\epsilon^{\alpha+} + \epsilon^{\alpha-})} \mathcal{B}_{s\,i} = N_{j\,D_s^{rec}ee}^{DT\;\alpha}$$

$$\sum_i \frac{(N^{\alpha+} + N^{\alpha-})(\epsilon_{ji\,+ee}^{dau\;DT\;\alpha} + \epsilon_{ji\,-ee}^{dau\;DT\;\alpha})}{2(\epsilon^{\alpha+} + \epsilon^{\alpha-})} \mathcal{B}_{s\,i} = N_{j\,D_s^{tag}ee}^{DT\;\alpha}$$

Result

$$N_0: D_s^+ D_s^{-*}$$
$$N_0: D_s^- D_s^{+*}$$

$$\Gamma = \frac{\mathcal{B}_s}{\tau_{D_s^*}}$$

$$\Gamma_i = \frac{\mathcal{B}_{s\,i}}{\tau_{D_s^*}}$$

Get $\mathcal{B}_{s\,i}$

$$\sum_i \frac{(N^{\alpha+} + N^{\alpha-})(\epsilon_{ji\,+ee}^{bac\,DT\,\alpha} + \epsilon_{ji\,-ee}^{bac\,DT\,\alpha})}{2(\epsilon^{\alpha+} + \epsilon^{\alpha-})}\mathcal{B}_s = N_{j\,D_s^{rec}ee}^{DT\,\alpha}$$

$$\sum_i \frac{(N^{\alpha+} + N^{\alpha-})(\epsilon_{ji\,+ee}^{dau\,DT\,\alpha} + \epsilon_{ji\,-ee}^{dau\,DT\,\alpha})}{2(\epsilon^{\alpha+} + \epsilon^{\alpha-})}\mathcal{B}_s = N_{j\,D_s^{tag}ee}^{DT\,\alpha}$$

$$f_+(q^2) = \frac{f_+(0)}{(1 - q^2/m_{\text{pole}}^2)}.$$

$$f_+(q^2) = \frac{f_+(0)}{(1 - q^2/m_{\text{pole}}^2)} \frac{1}{\left(1 - \alpha_{\text{BK}} \frac{q^2}{m_{\text{pole}}^2}\right)}.$$

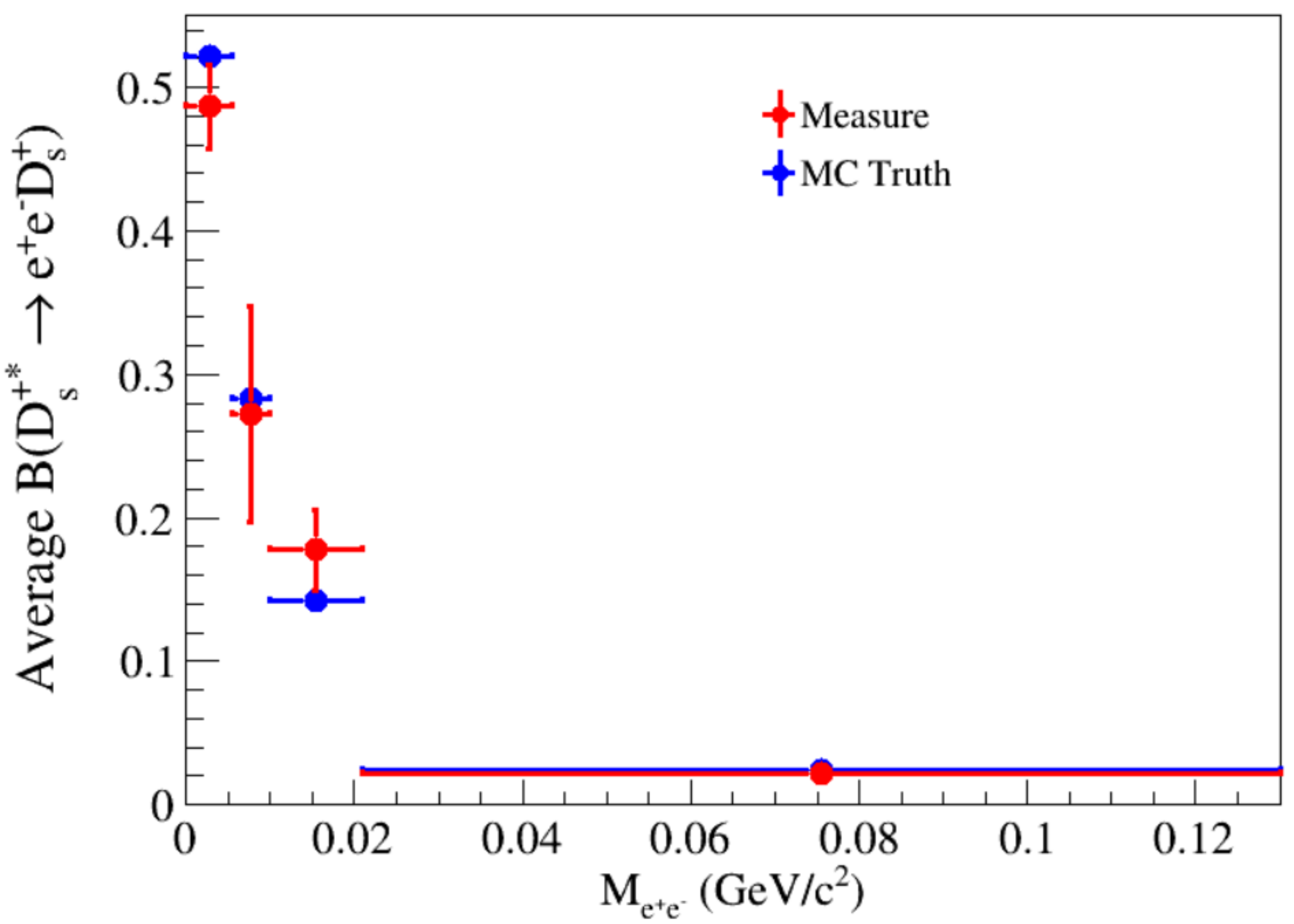
$$z(q^2, t_0) = \frac{\sqrt{t_+ - q^2} - \sqrt{t_+ - t_0}}{\sqrt{t_+ - q^2} + \sqrt{t_+ - t_0}}, \tag{248}$$

where $t_\pm \equiv (m_D \pm m_P)^2$ and t_0 is the (arbitrary) q^2 value corresponding to $z = 0$. The physical region corresponds

$$\begin{aligned}\Phi(t, t_0) = &\sqrt{\frac{1}{24\pi\chi_V}}\left(\frac{t_+ - t}{t_+ - t_0}\right)^{1/4}(\sqrt{t_+ - t} + \sqrt{t_+})^{-5} \\ &\times(\sqrt{t_+ - t} + \sqrt{t_+ - t_0})(\sqrt{t_+ - t} + \sqrt{t_+ - t_-})^{3/2} \\ &\times(t_+ - t)^{3/4},\end{aligned}$$

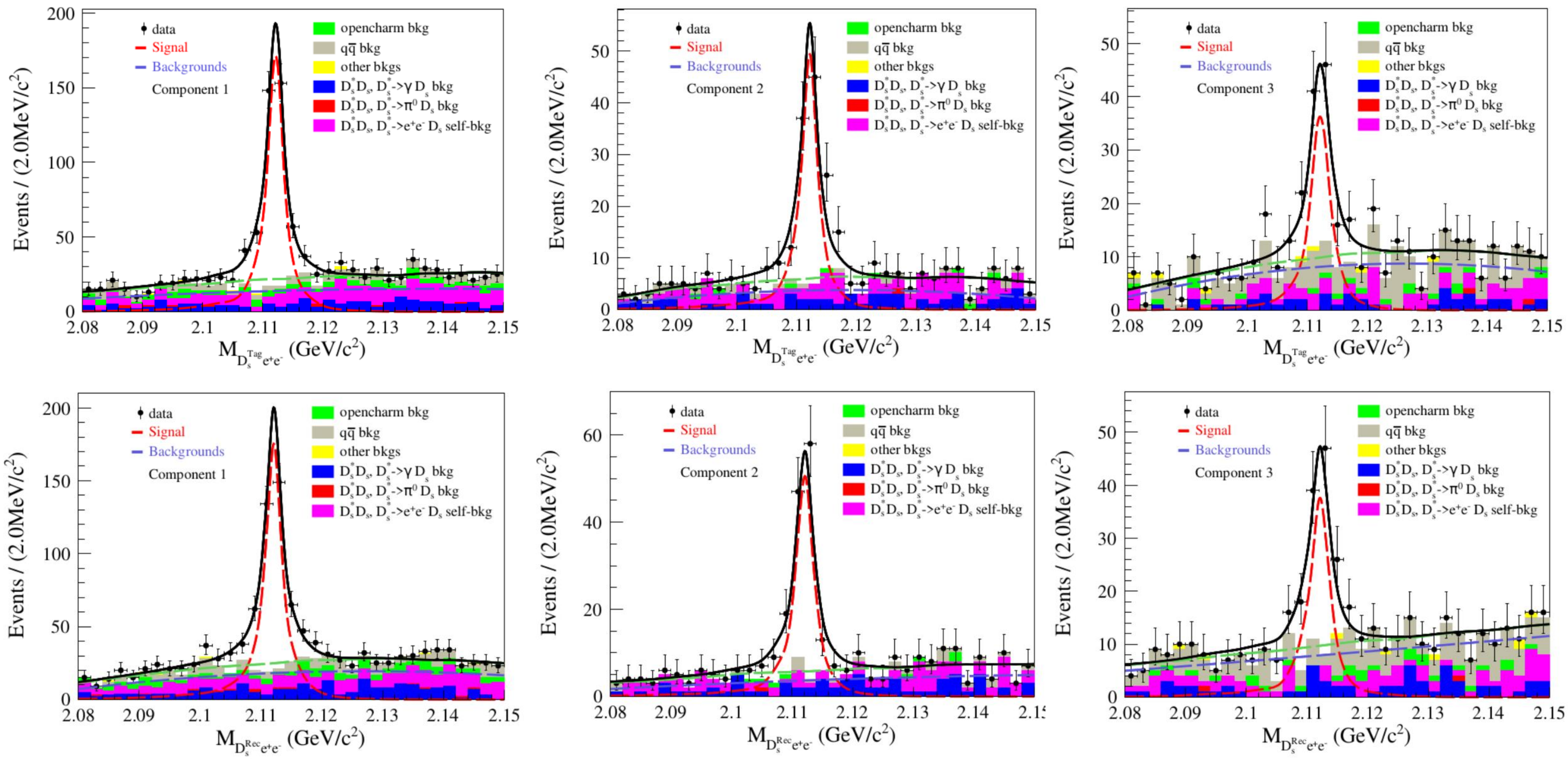
$$P(q^2) \equiv \begin{cases} 1 & (D \to \pi) \\ z(q^2, M_{D_s^*}^2) & (D \to K). \end{cases}$$

$$f_+(q^2) = \frac{1}{P(q^2)\,\phi(q^2, t_0)} \sum_{k=0}^{\infty} a_k(t_0)[z(q^2, t_0)]^k,$$

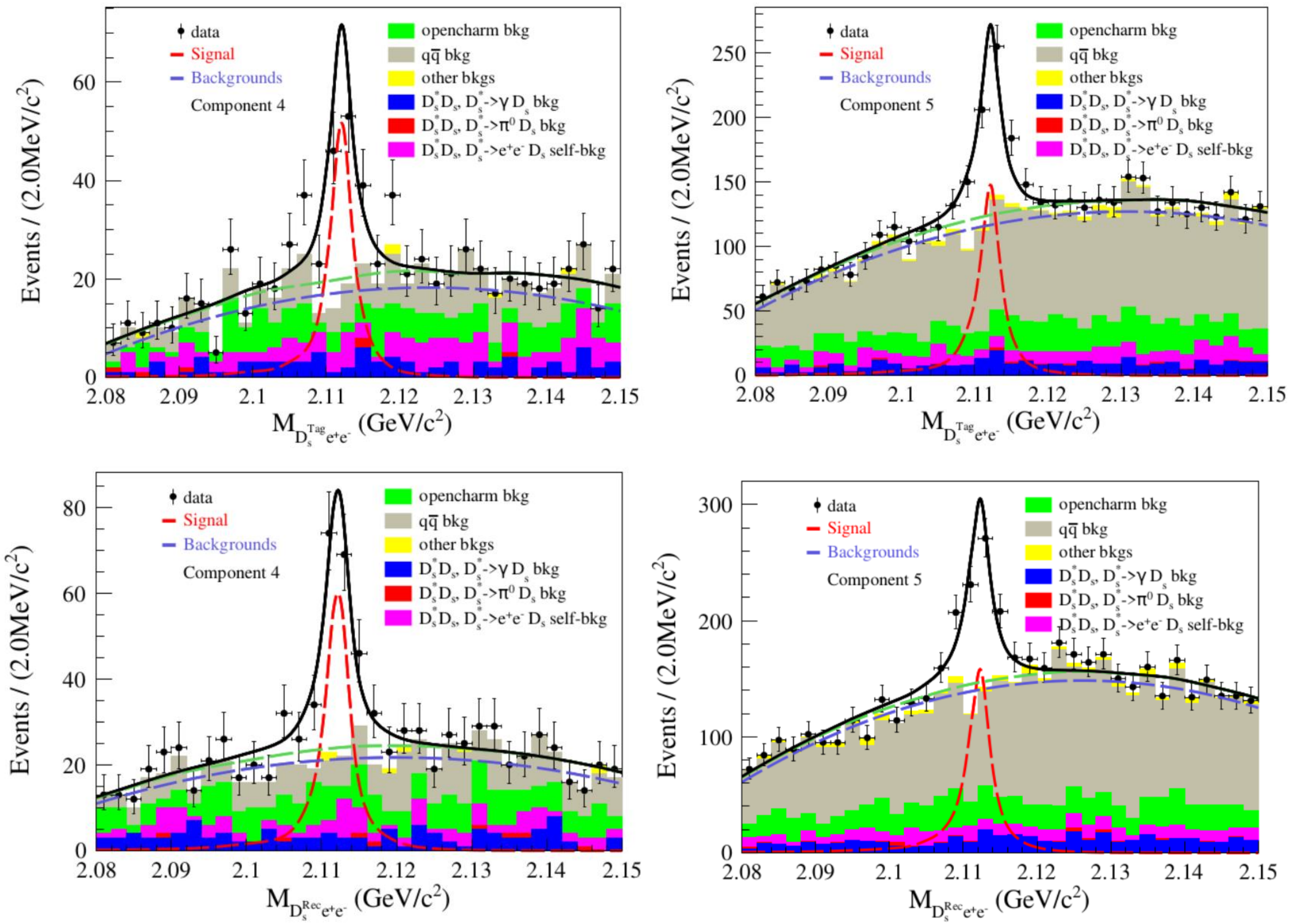


Measure
MC Truth
Average $B(D_s^{+*} \to e^+e^-D_s^+)$
$M_{e^+e^-}$ (GeV/c^2)
0
0.1
0.2
0.3
0.4
0.5
0.02
0.04
0.06
0.08
0.12

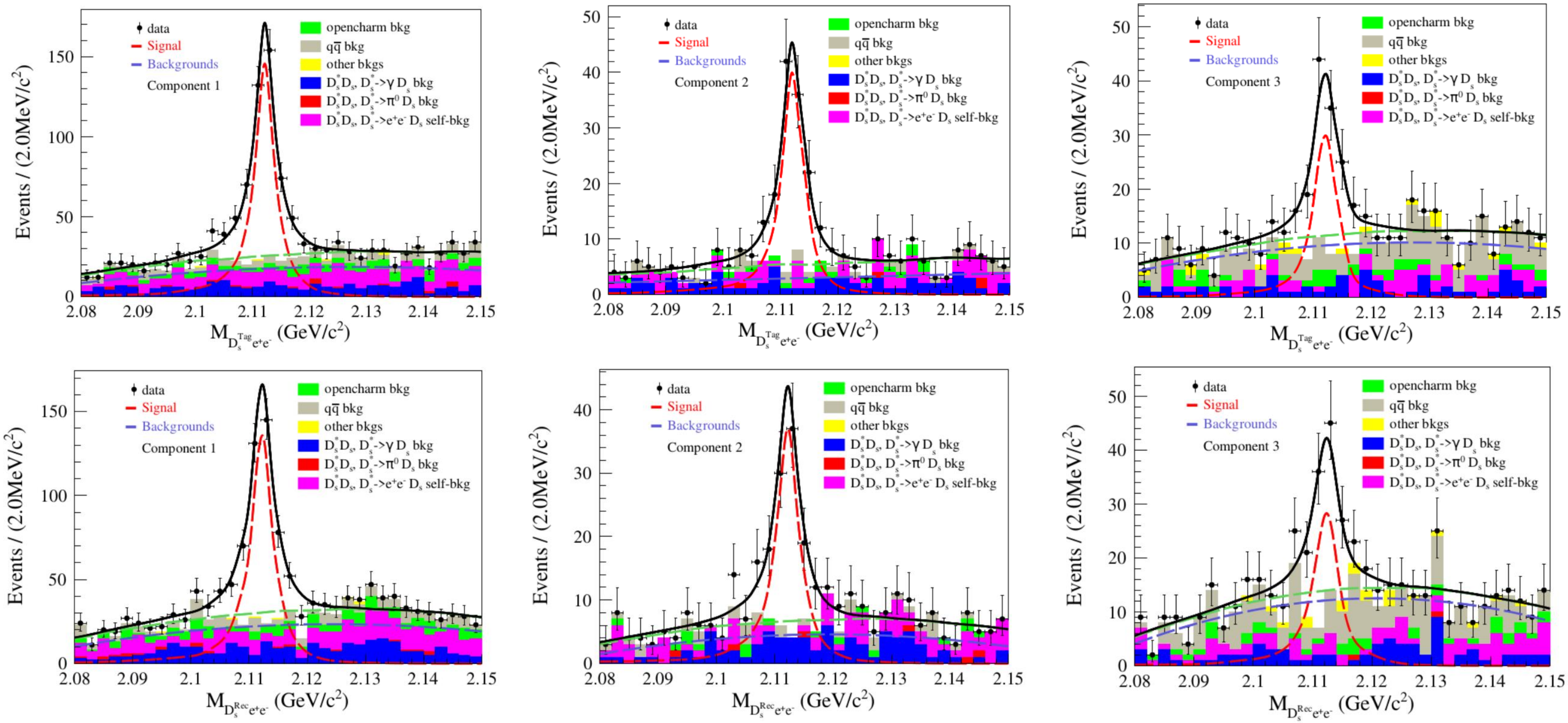
Bin1: (0.0000,0.0055)



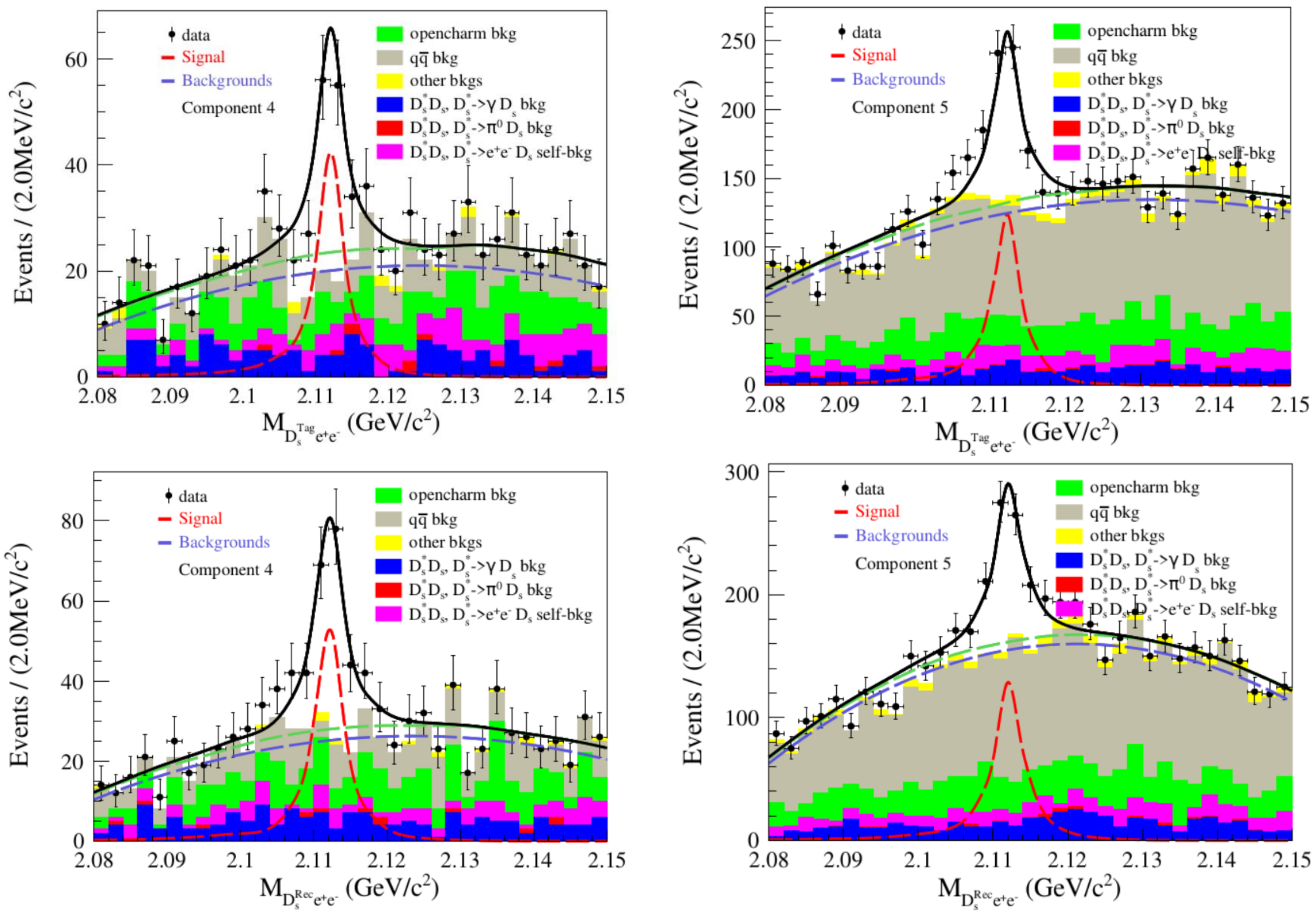
Bin1: (0.0000,0.0055)



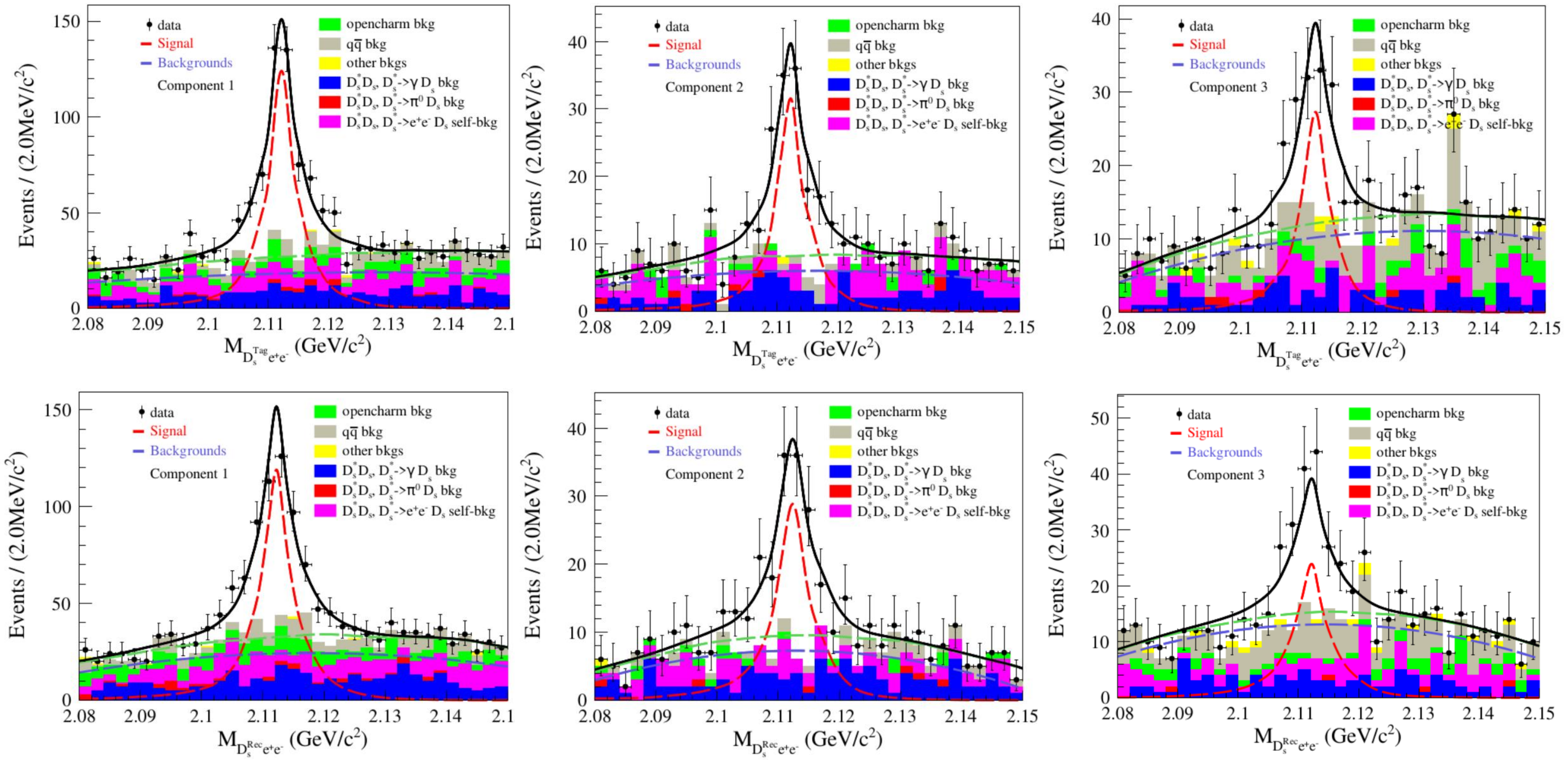
Bin2: (0.0055,0.0100)



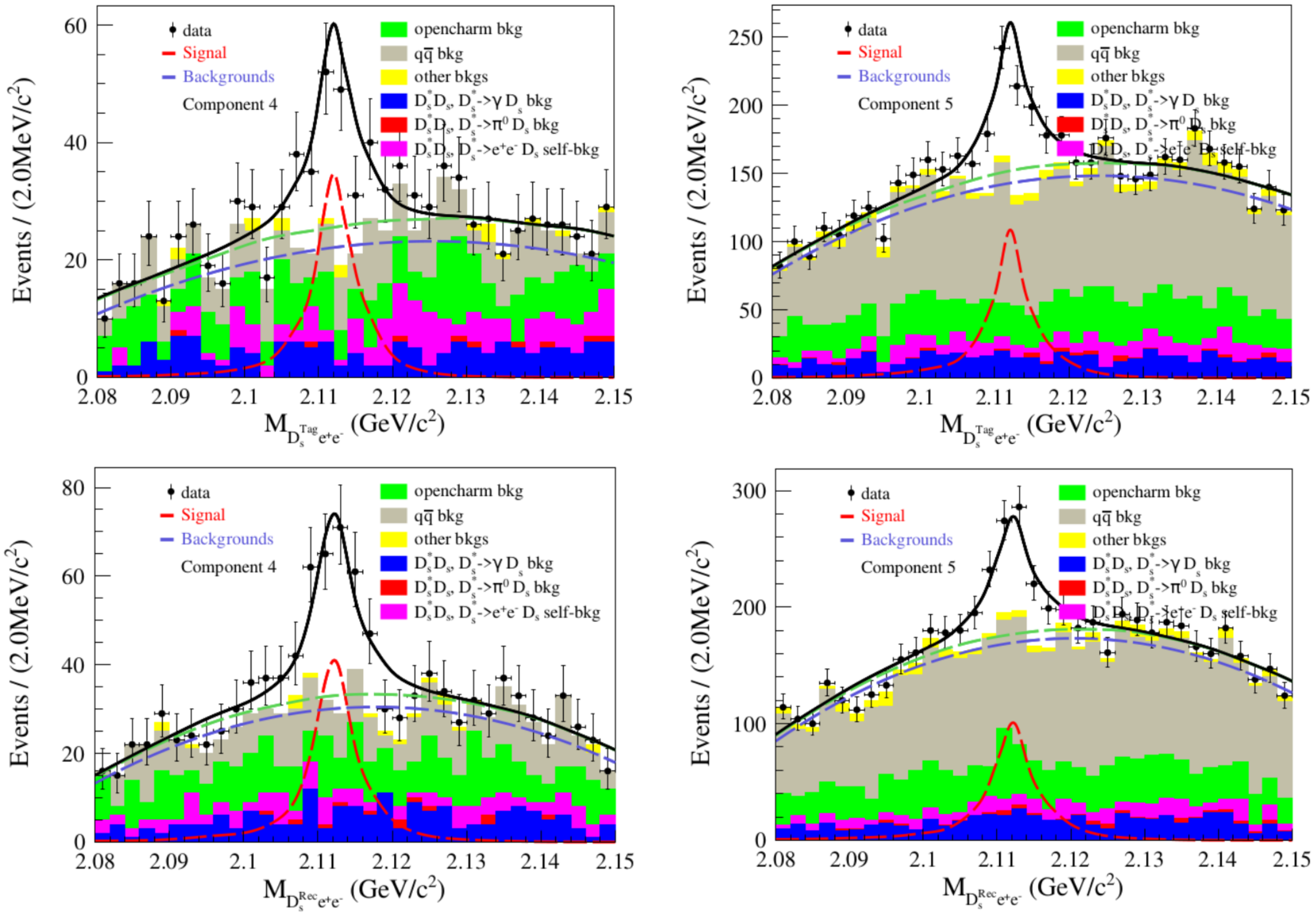
Bin2: (0.0055,0.0100)



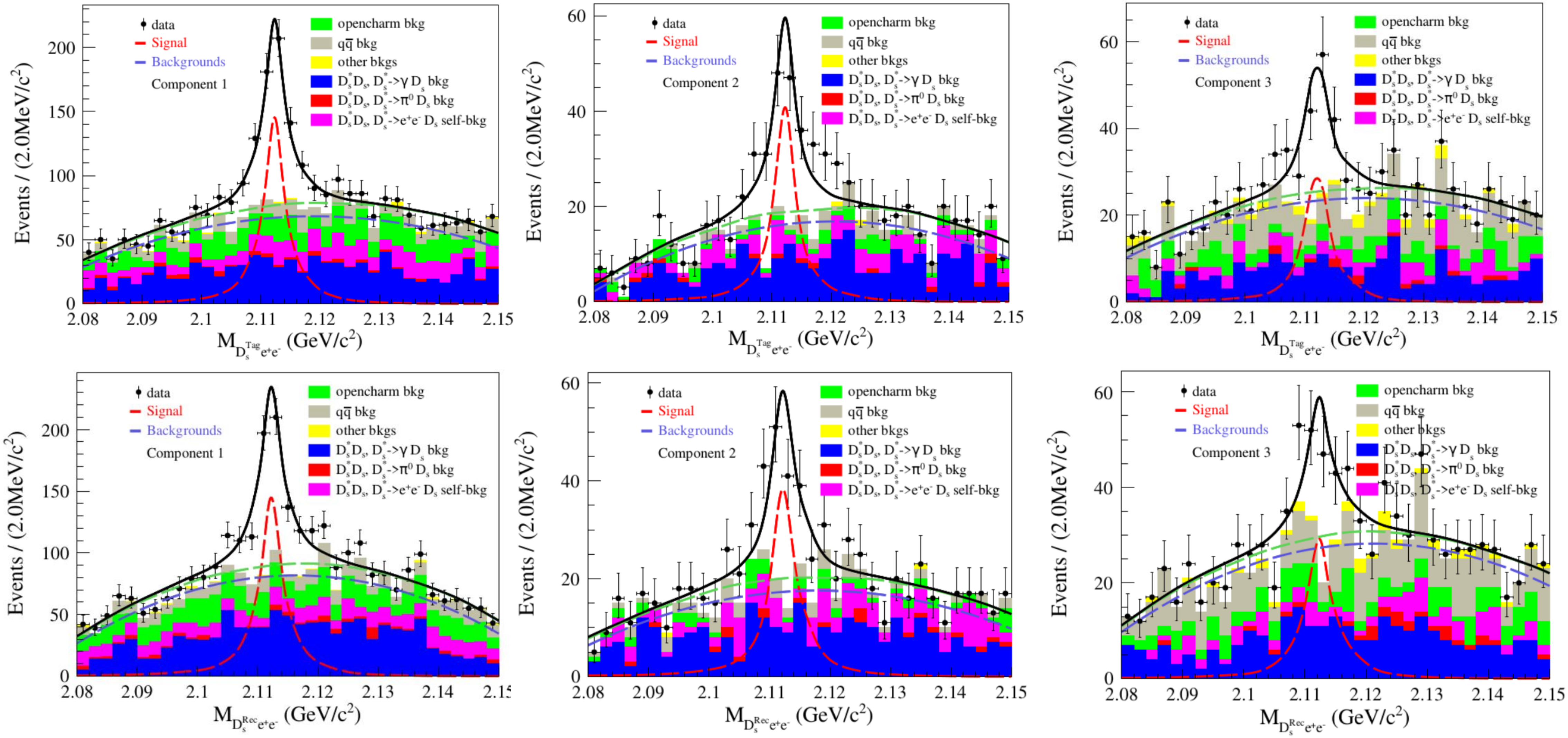
Bin3: (0.0100,0.0210)



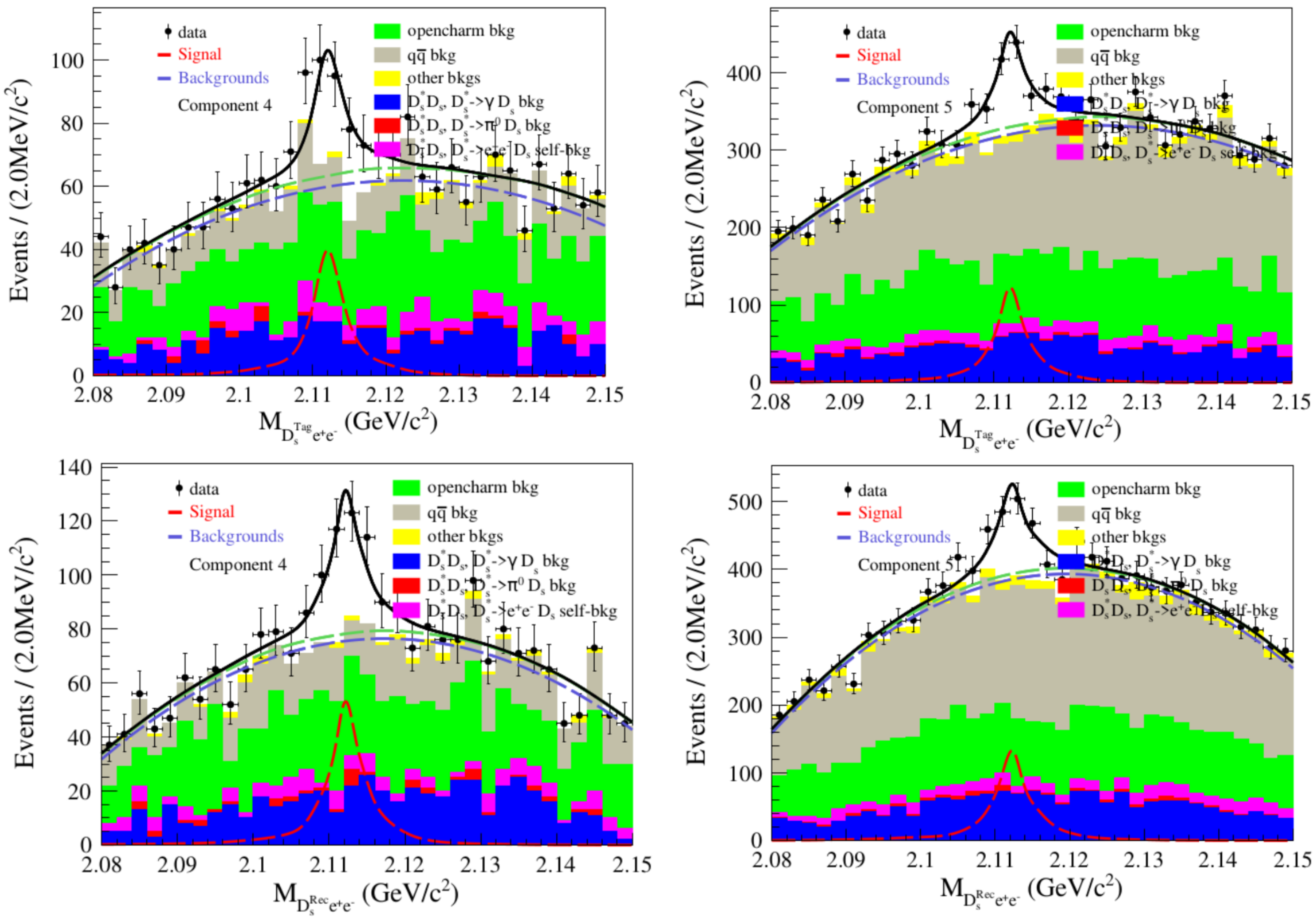
Bin3: (0.0100,0.0210)



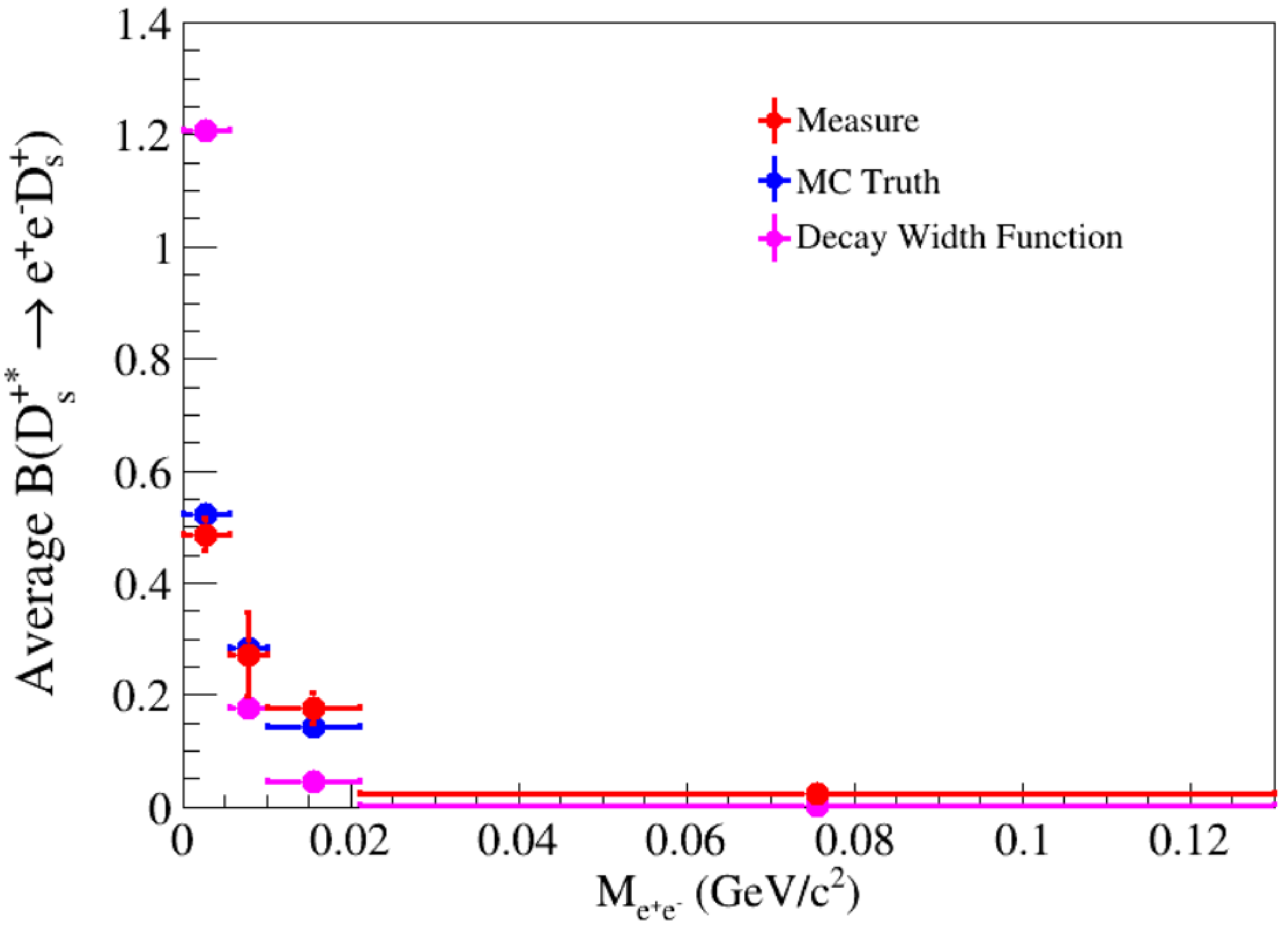
Bin4: (0.0210,0.1300)



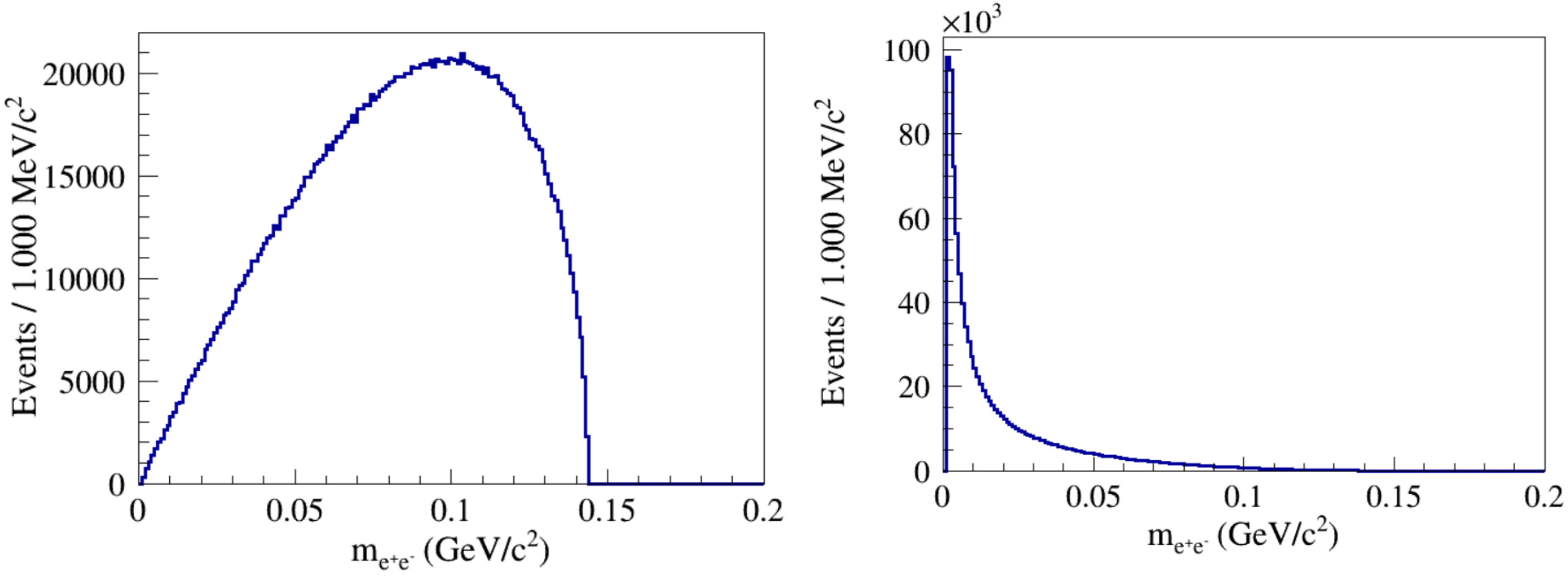
Bin4: (0.0210,0.1300)



Problem



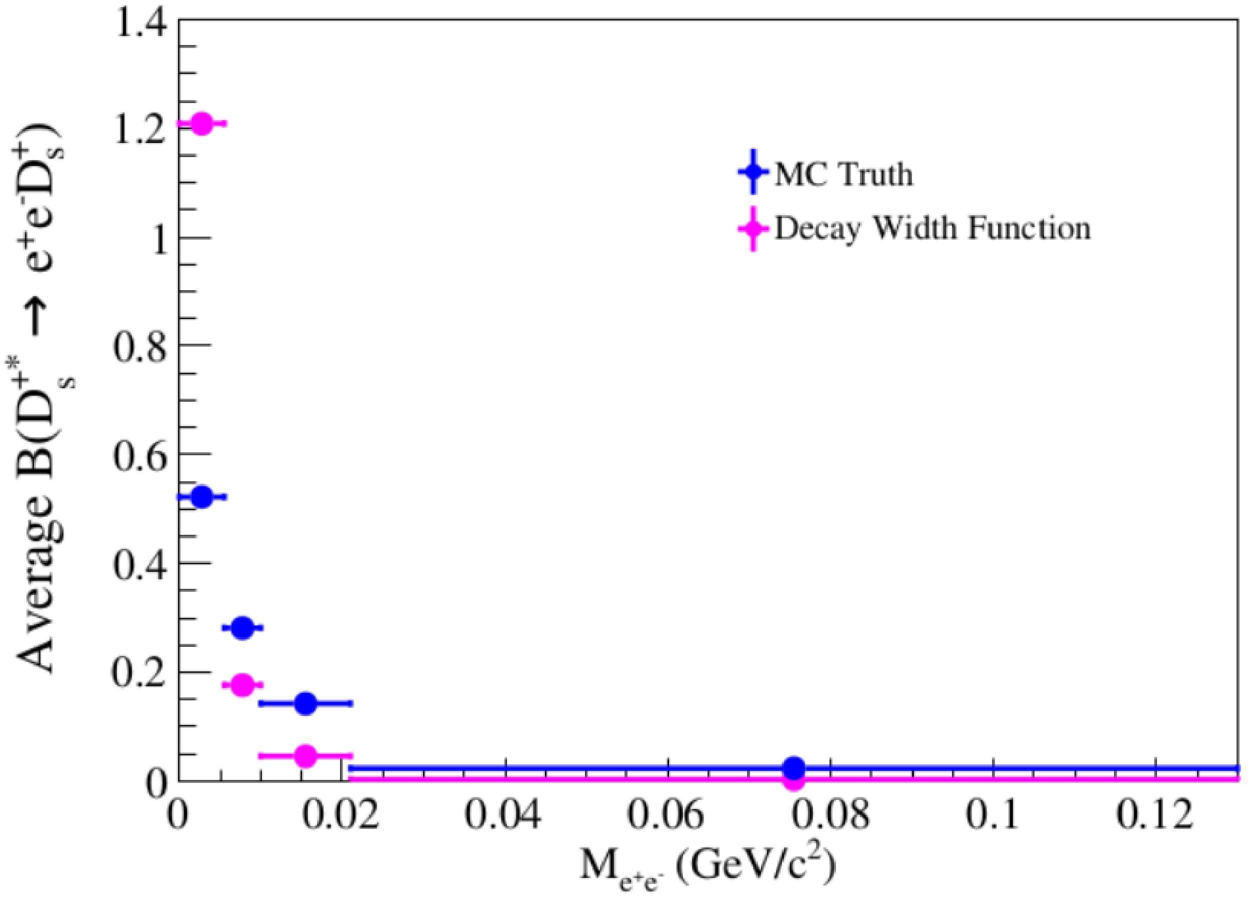
Measure
MC Truth
Decay Width Function
Average B($D_s^{*+} \to e^+e^-D_s^+$)
$M_{e^+e^-}$ (GeV/c^2)



Events / 1.000 MeV/c^2
20000
15000
10000
5000
0
0
0.05
0.1
0.15
0.2
$m_{e^+e^-}$ (GeV/c^2)
×10^3
100
80
60
40
20
0
Events / 1.000 MeV/c^2
0
0.05
0.1
0.15
0.2
$m_{e^+e^-}$ (GeV/c^2)

```
// calculated the max amplitude square in 20000 events, is it enough larger?
  if(nrun==1){
     int ir,nd;
     for(ir=0;ir<=200000;ir++){
  loop0:
       p->initializePhaseSpace(getNDaug(),getDaugs());
       int nd=p->getNDaug(),i;
       _nd=nd;
       for(i=0;i<=nd-1;i++){
          _p4Lab[i]=p->getDaug(i)->getP4Lab();
          _p4CM[i]=p->getDaug(i)->getP4();
       }
       amps=AmplitudeSquare();
       if(amps<0) goto loop0;
       if(amps>max_amps) max_amps=amps*1.01;
       nrun++;
     }
  }
```

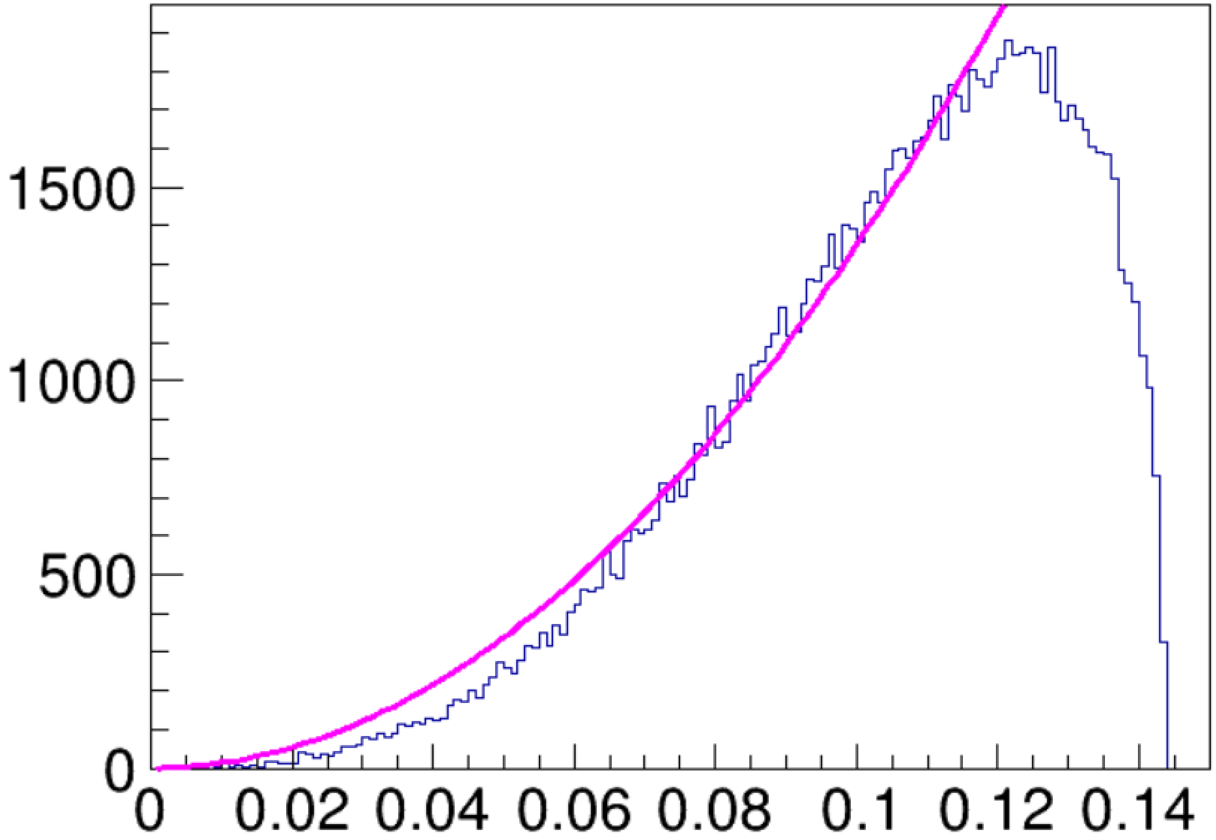
```
//  Put phase space results into the daughters.
   amps=AmplitudeSquare();
   if(amps < 0) goto loop;
   SamAmps=amps/max_amps;
   rd1=EvtRandom::Flat(0.0, 1.0);
  if(rd1>=SamAmps) goto loop;
  return ;
```



MC Truth
Decay Width Function
Average $B(D_s^{+*} \to e^+e^-D_s^+)$
$M_{e^+e^-}$ (GeV/c^2)
0
0.2
0.4
0.6
0.8
1
1.2
1.4
0.02
0.04
0.06
0.08
0.1
0.12

```
s12=(_pd[0]+_pd[1]).mass2();  //q^2
```

```
tmp = s12;  //Check I
```



CP even	CP odd	CP Mix	Flavoured
K^+K^-	$K_S\pi^0$	$K_S\pi^+\pi^-$(Bin)	$K^+e^-\bar{\nu}_e$
$\pi^+\pi^-$	$K_s\eta(\gamma\gamma)$	$K_L\pi^+\pi^-$(Bin)	$K^+\pi^-$
$\pi^0\pi^0$	$K_s\eta(\pi^+\pi^-\pi^0)$	$K^+K^-\pi^0$	$K^+\pi^-\pi^0$
$K_S\pi^0\pi^0$	$K_s\eta'(\pi^+\pi^-\gamma)$	$(\pi^+\pi^-\pi^+\pi^-)$	$K^+\pi^-\pi^+\pi^-$
$K_L\omega$	$K_s\eta'(\pi^+\pi^-\eta)$	$(K_S\pi^+\pi^-\pi^0)$	
$\pi^+\pi^-\pi^0(0.97)$	$K_s\omega$		
$K_L\pi^0$	$K_L\pi^0\pi^0$		