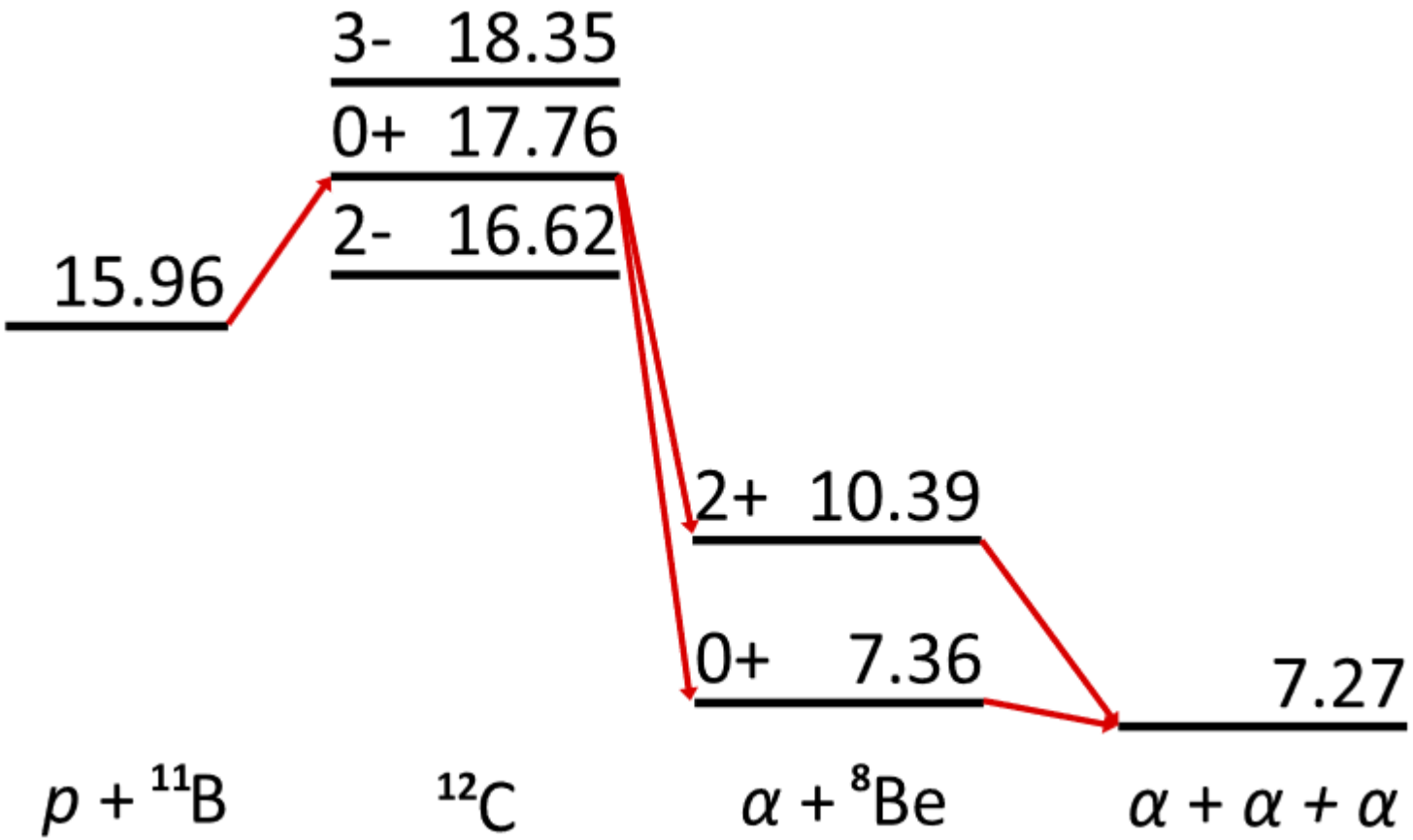
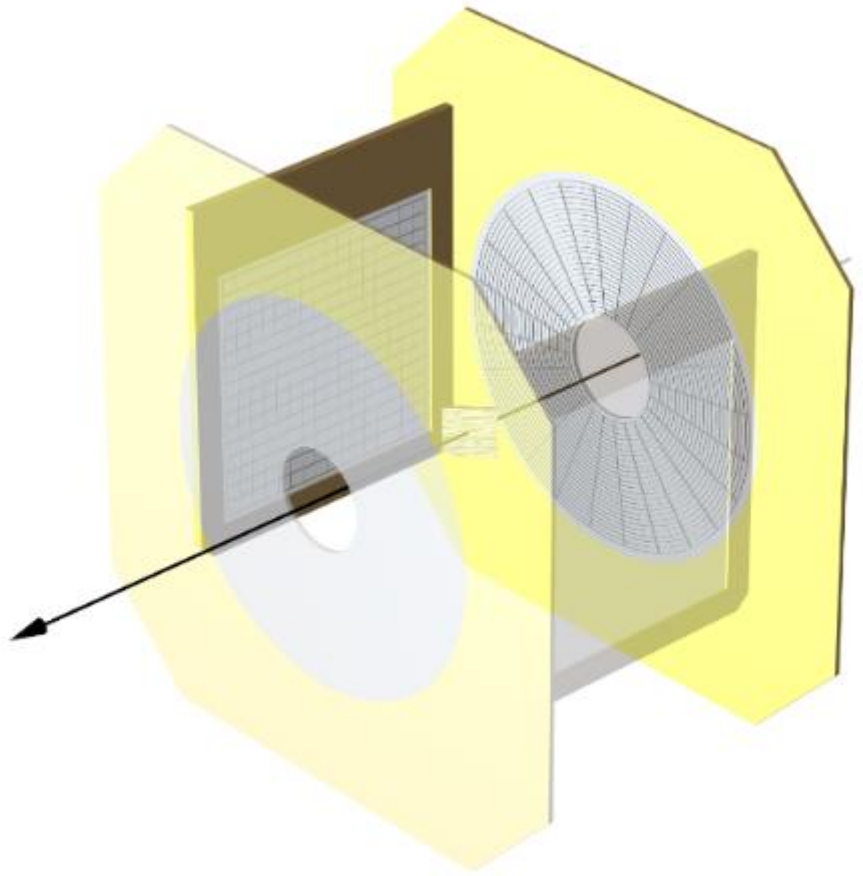
Dalitz-plot analysis of the 16.62, 17.76, and 18.35 MeV resonances of ^{12}C

IMPRS RECRUITING WORKSHOP

Carbon-12 reactions



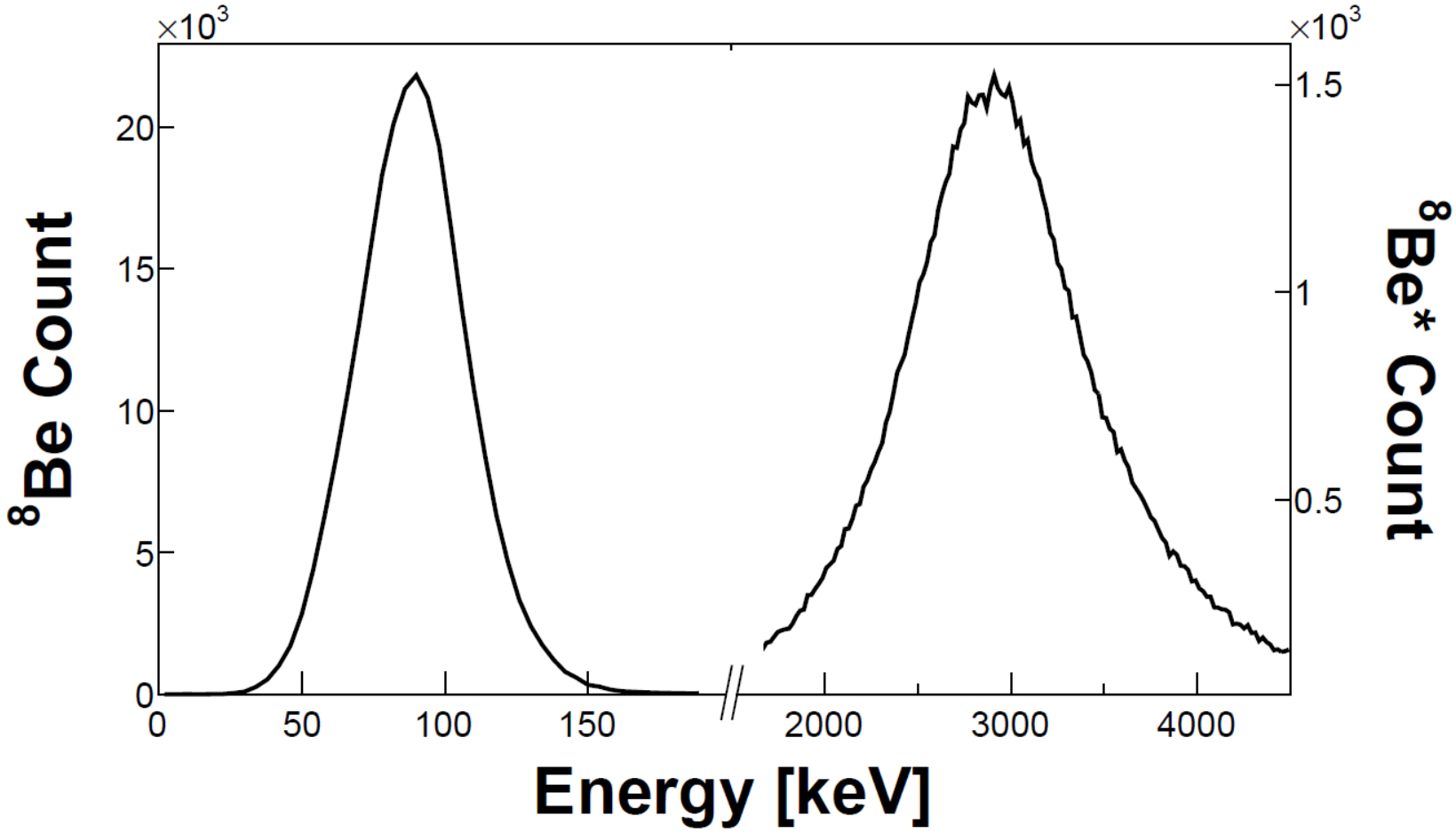
Carbon-12 reactions



Excitation energies

- ^{8}Be excitation energy

E(level)	J^{π}	$T_{1/2}$
0.0	0^{+}	5.57 eV *25*
3030 *10*	2^{+}	1513 keV *15*



Excitation energies

- ^{8}Be excitation energy
- Count of α_0 and α_1 events

Data	α_0 hits	α_0 eff.	α_1 hits	α_1 eff.	$\Gamma_{\alpha_0}/\Gamma_{\alpha_1}$
0^+	257 493	6.6(3)%	521 303	2.10(44)%	0.157(33)

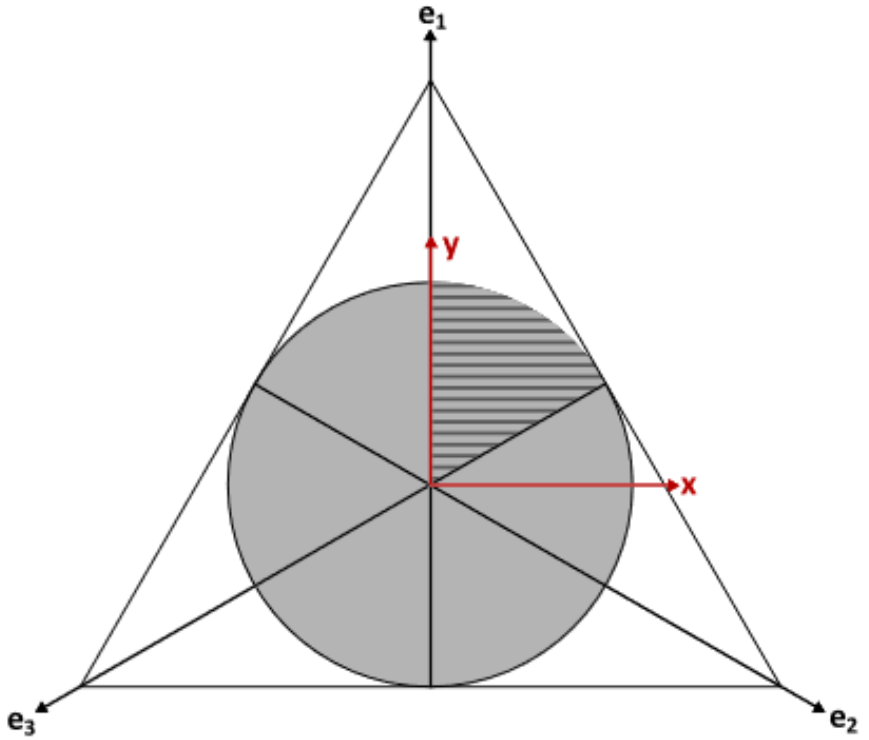
Symons 0.209

Segel (adopted standard) 0.403

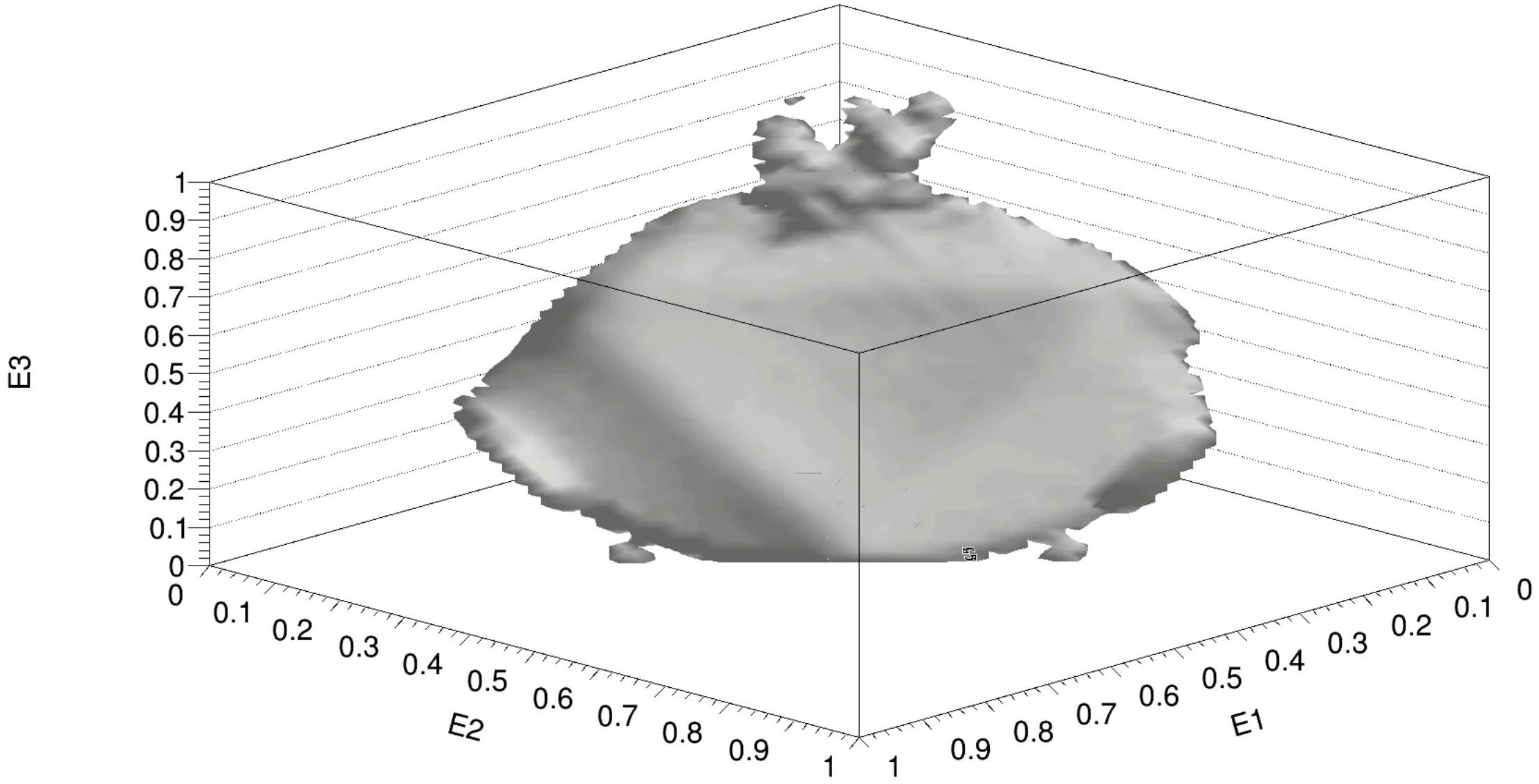
Dalitz-plots

- What is a Dalitz plot?

$$x = \sqrt{3}\frac{E_2 - E_3}{E_{tot}} \qquad y = \frac{3E_1}{E_{tot}} - 1$$

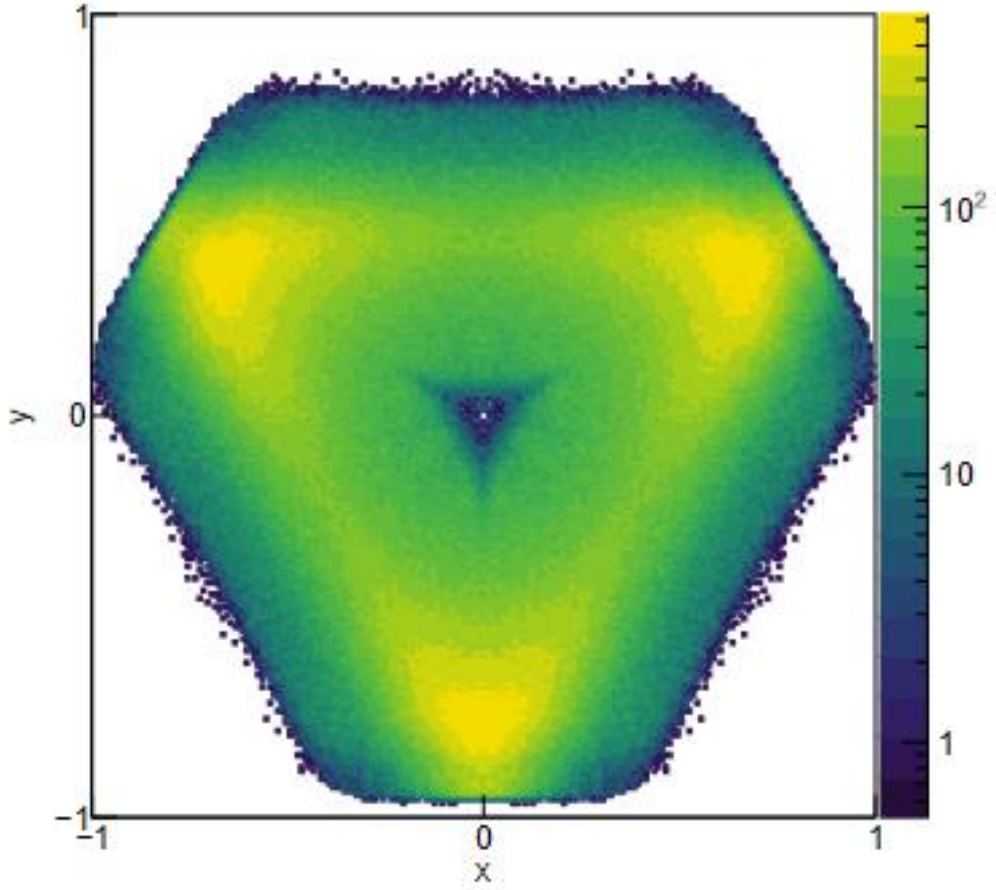


3D Dalitz


E3
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
E2
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
E1

Dalitz-plots

- What is a Dalitz plot?
  - Example



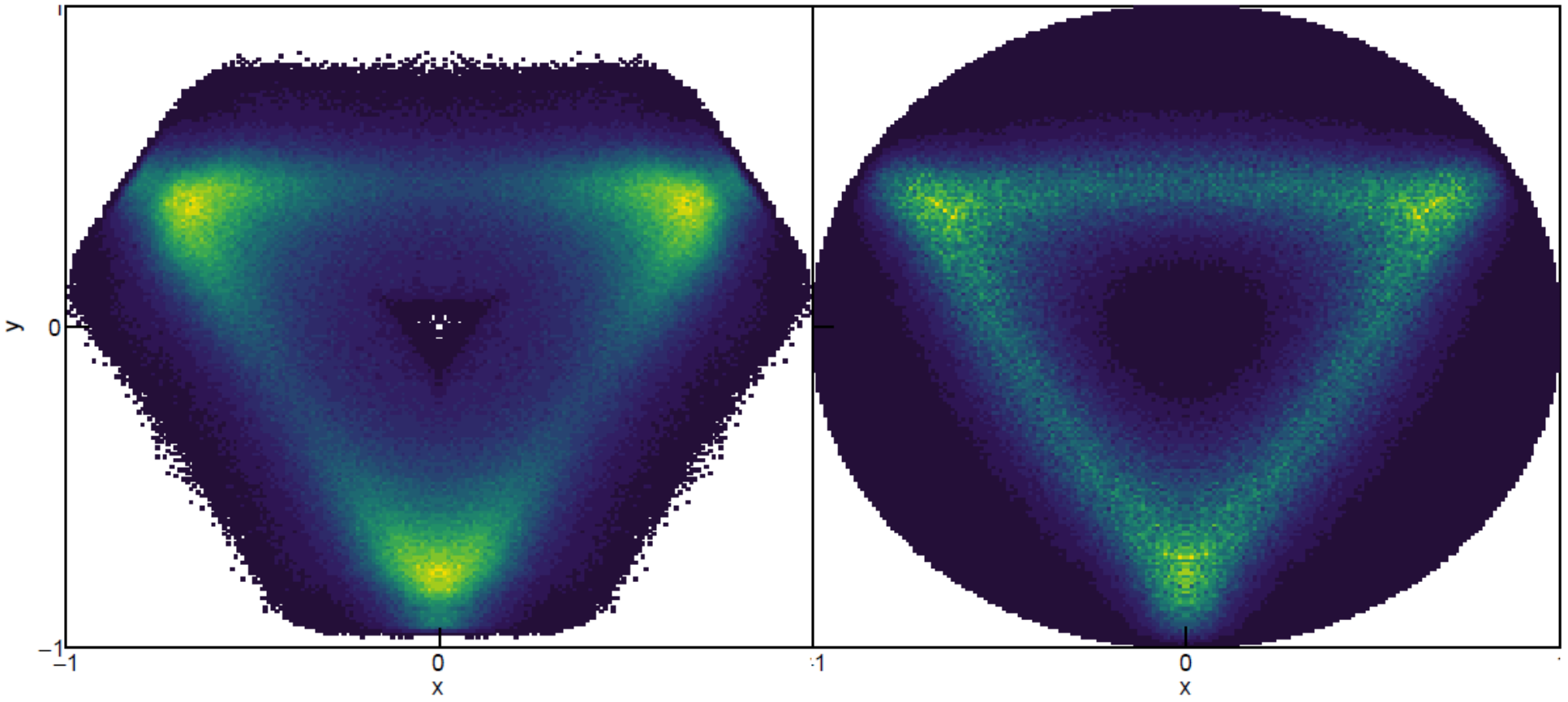
Dalitz-plots

- What do we expect this Dalitz plot to look like?

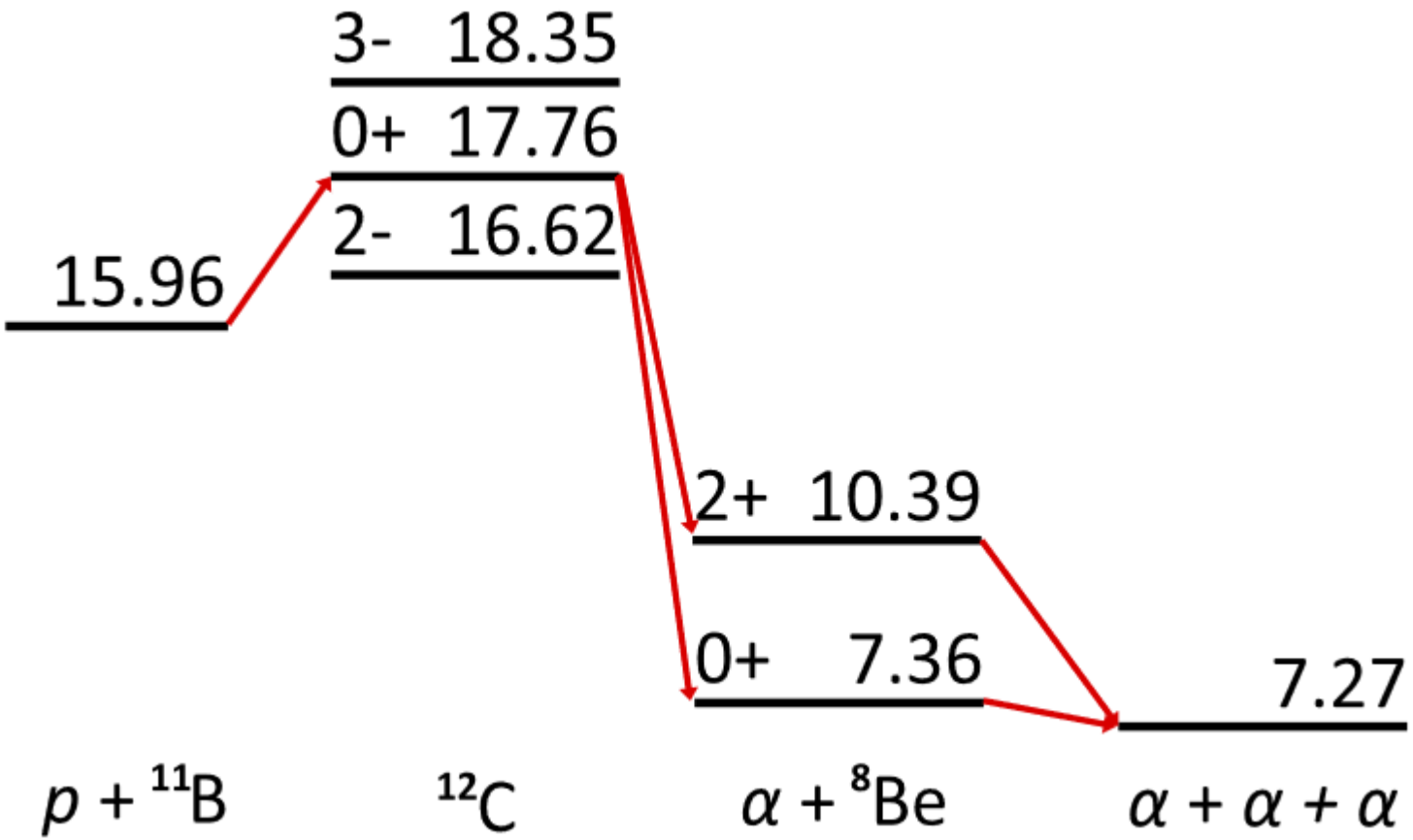
Dalitz-plots

- What do we expect this Dalitz plot to look like?
- Simulations!

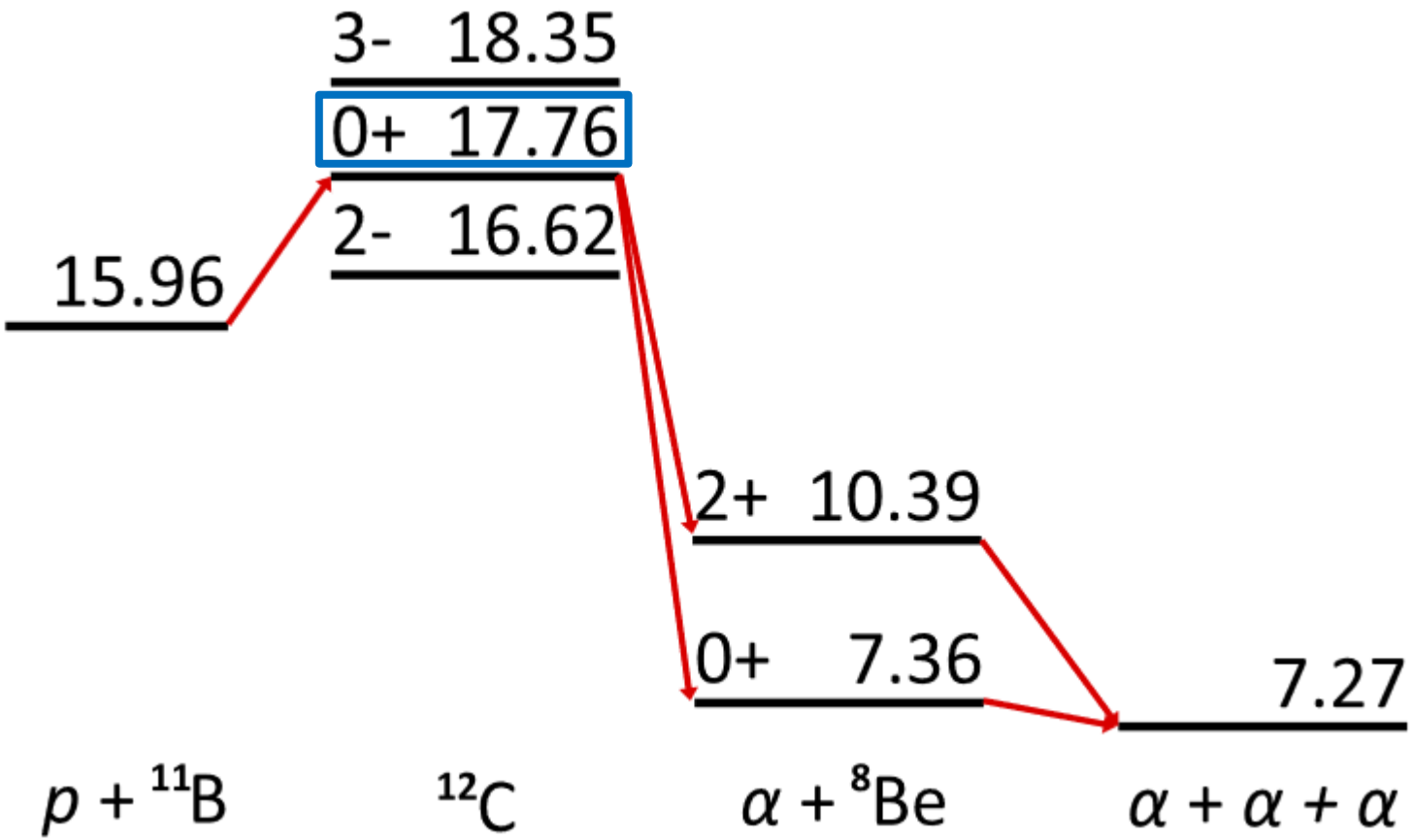
Dalitz-plot fits (0^+ data)



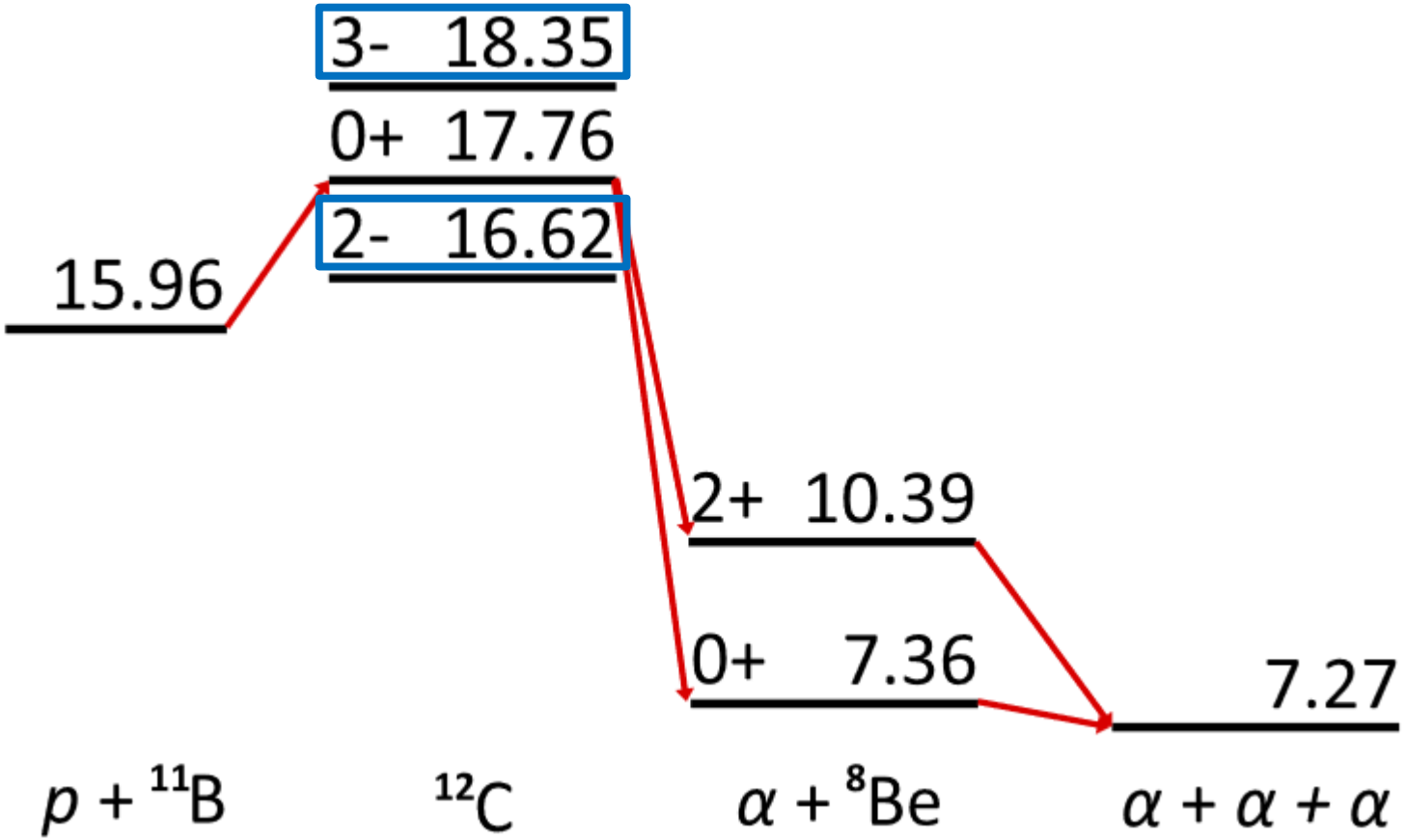
The carbon-12 reaction



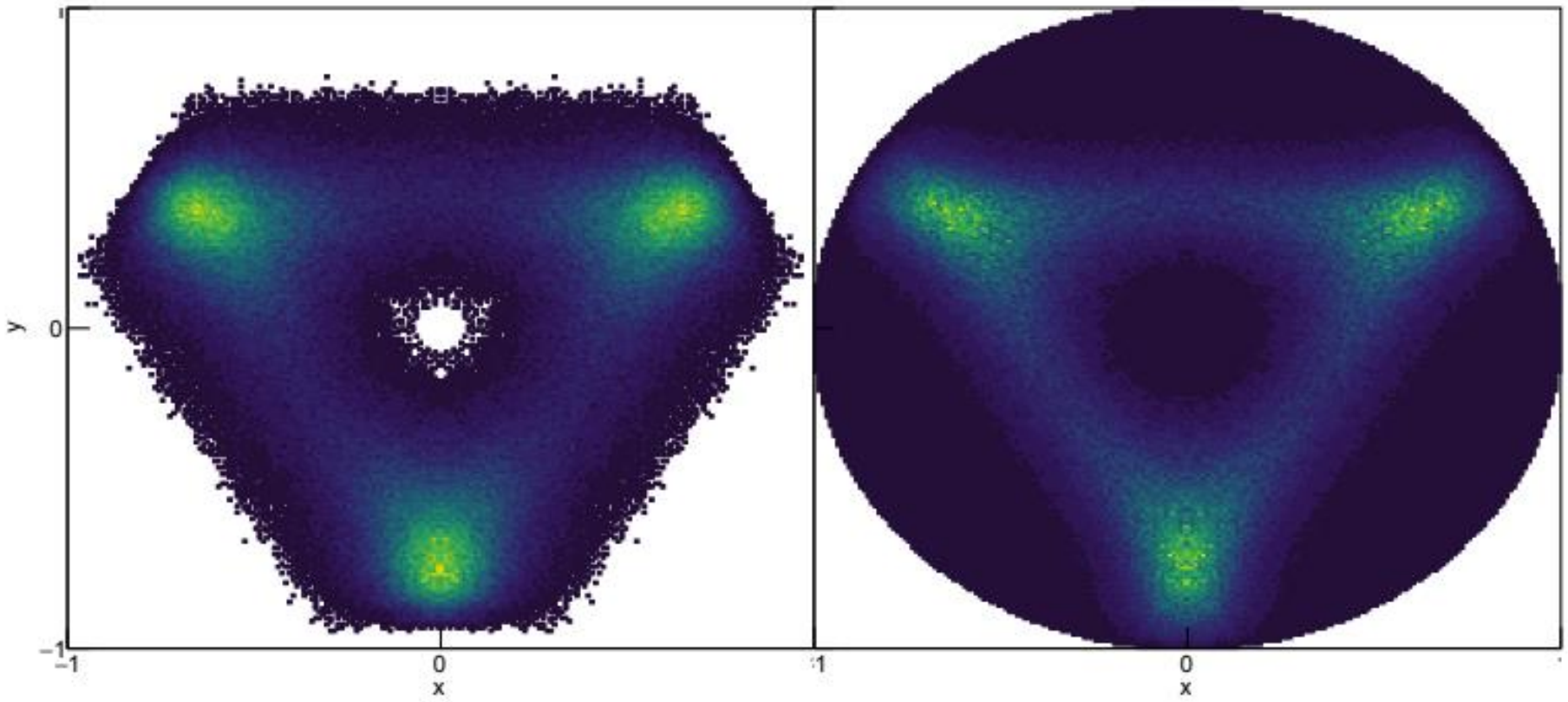
The carbon-12 reaction



The carbon-12 reaction



Dalitz-plot fits (2^- data)



Dalitz-plot fits (3^- data)