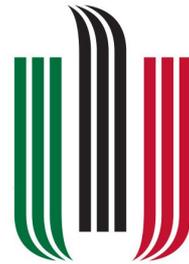


Ćwiczenie W

Krzysztof Cieśla



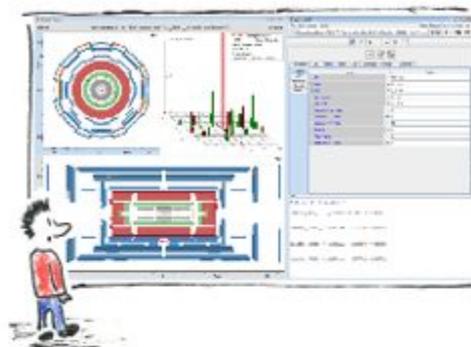
AGH

Warsztaty ATLAS Masterclasses
20 Lutego 2025

Cel ćwiczenia



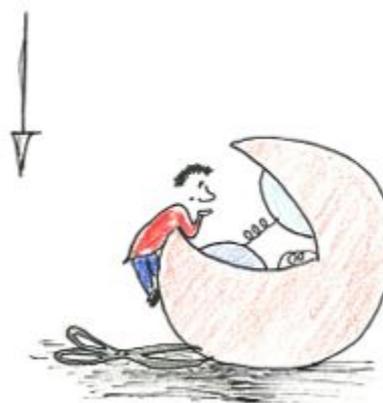
Identyfikacja cząstek



Identyfikacja przypadków

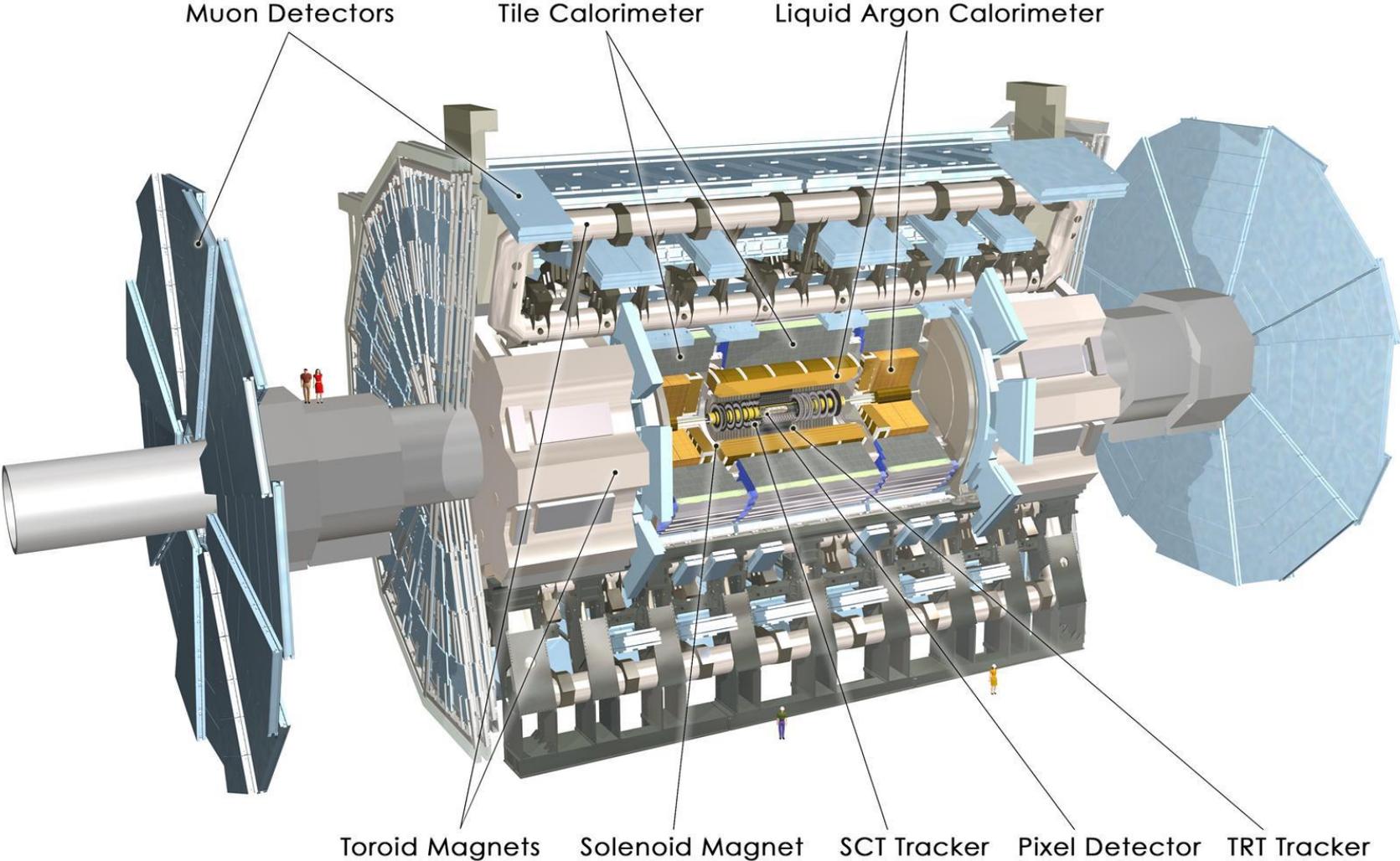


Poszukiwanie bozonu Higgsa

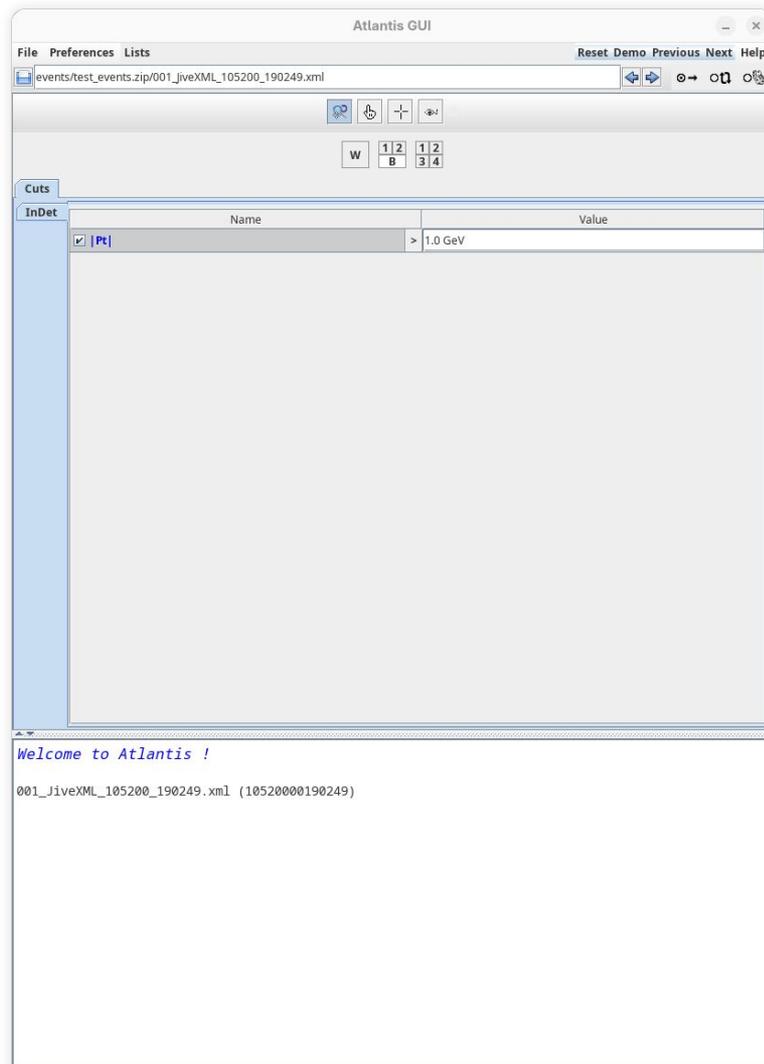
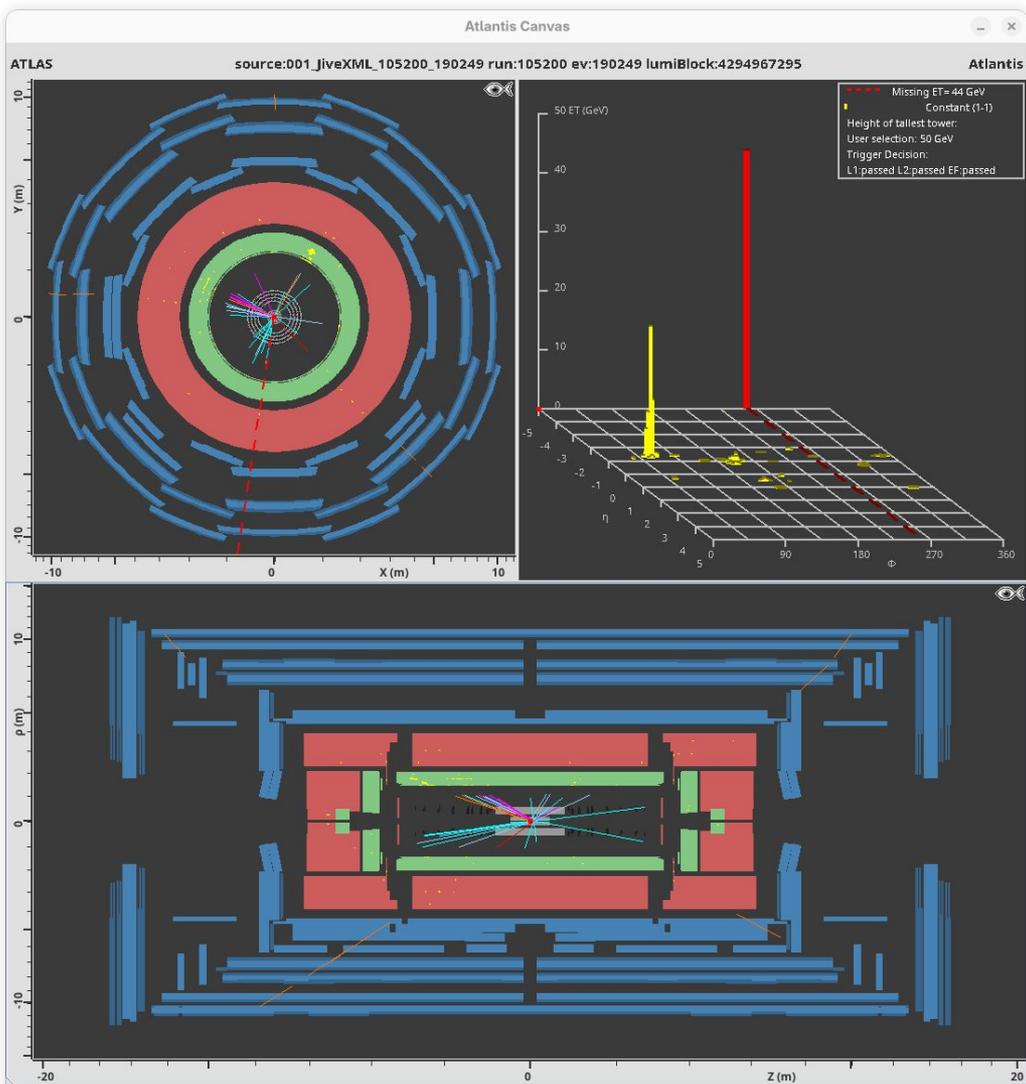


Badanie struktury protonu

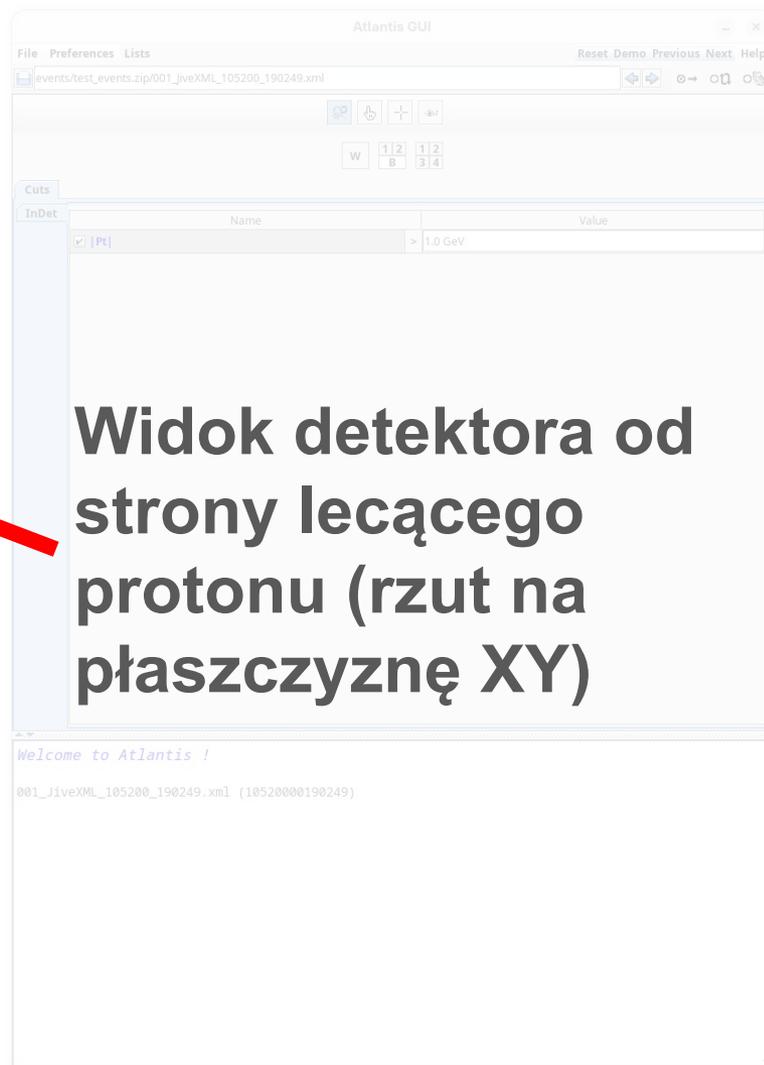
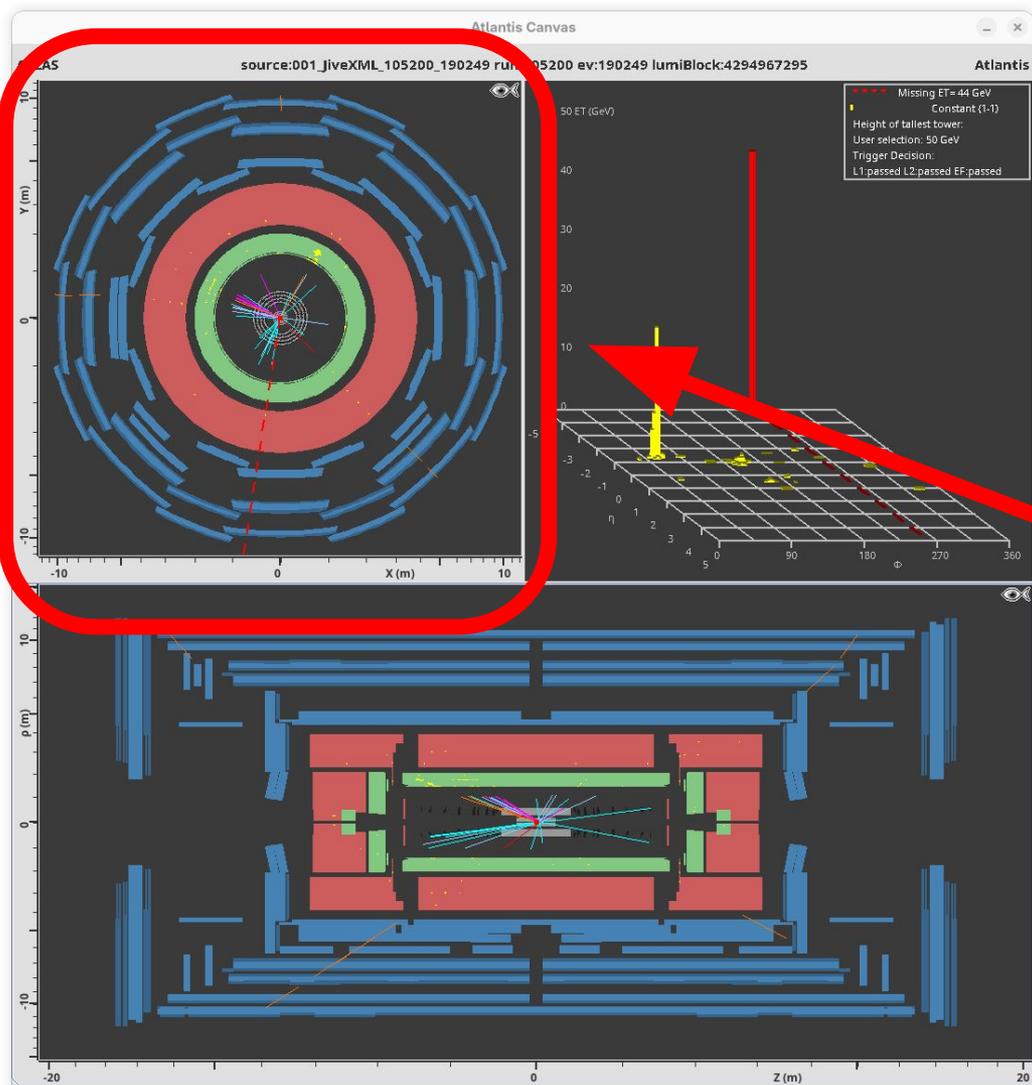
Detektor ATLAS



Program MINERVA

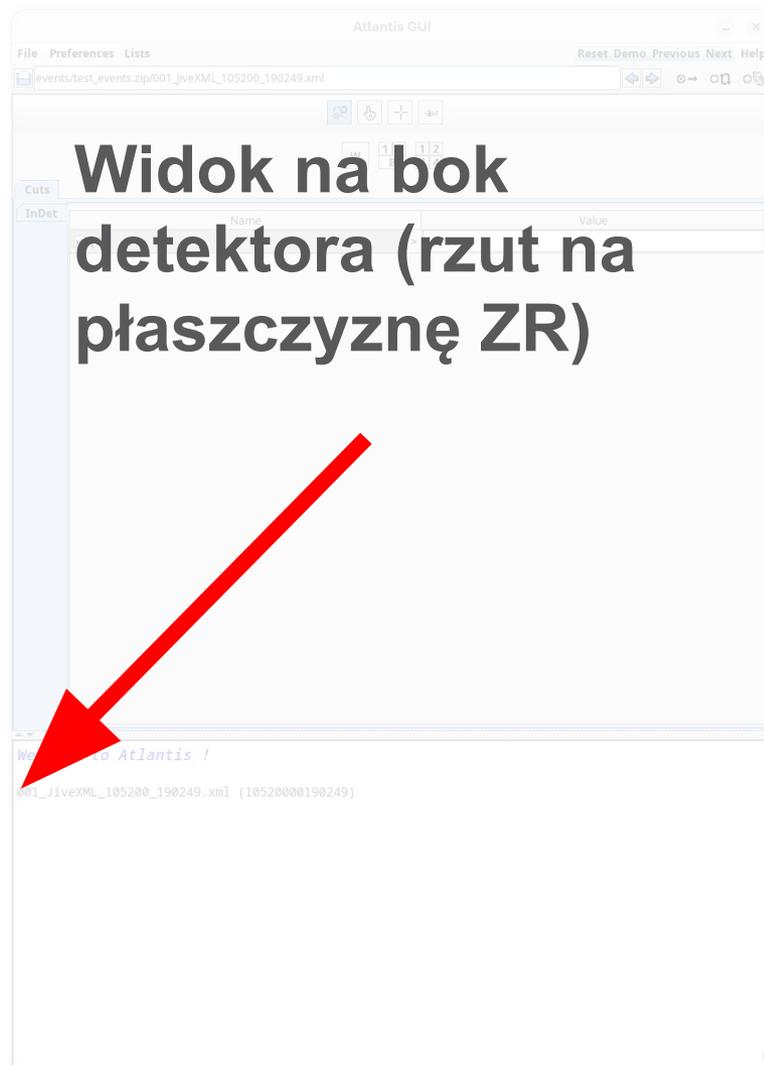
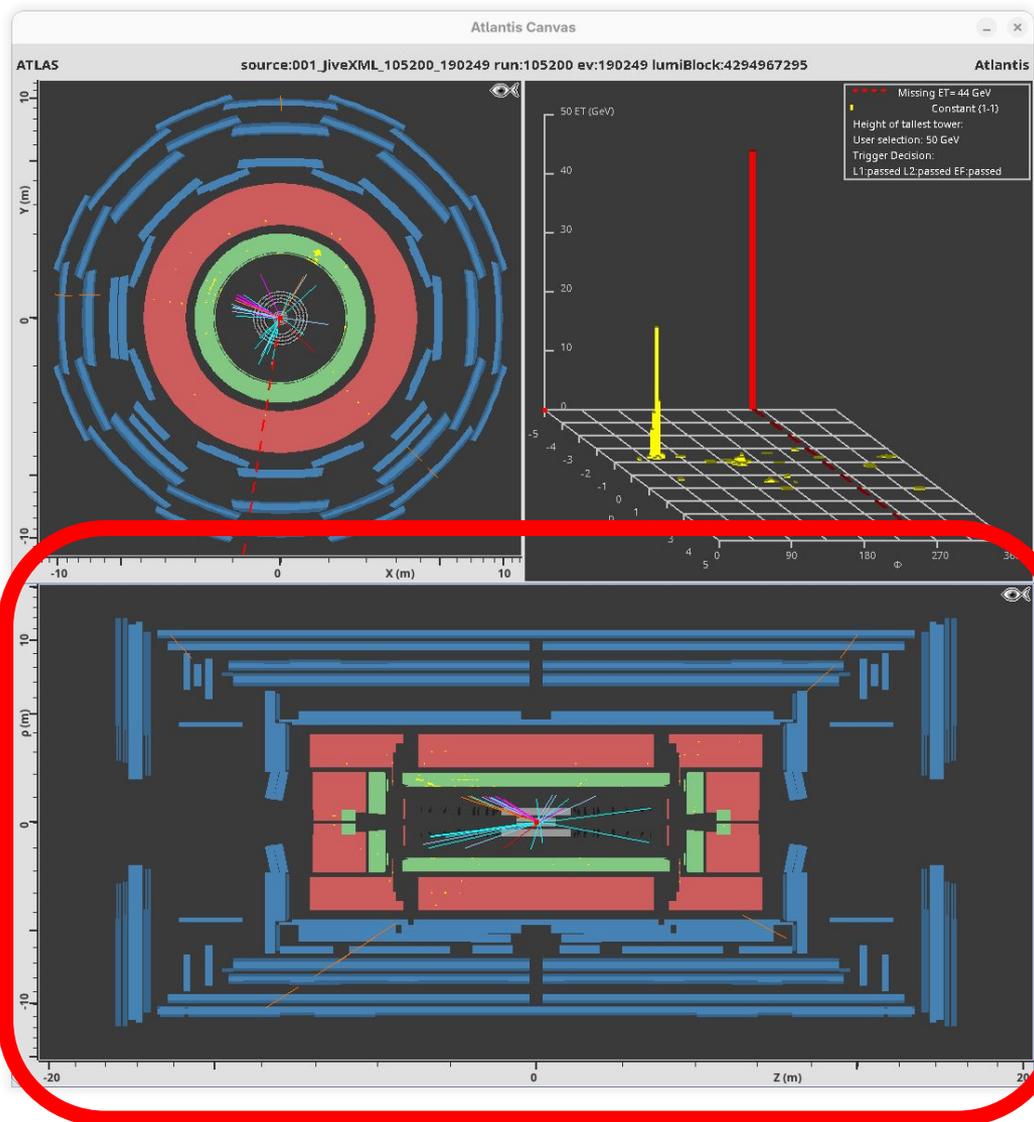


Program MINERVA

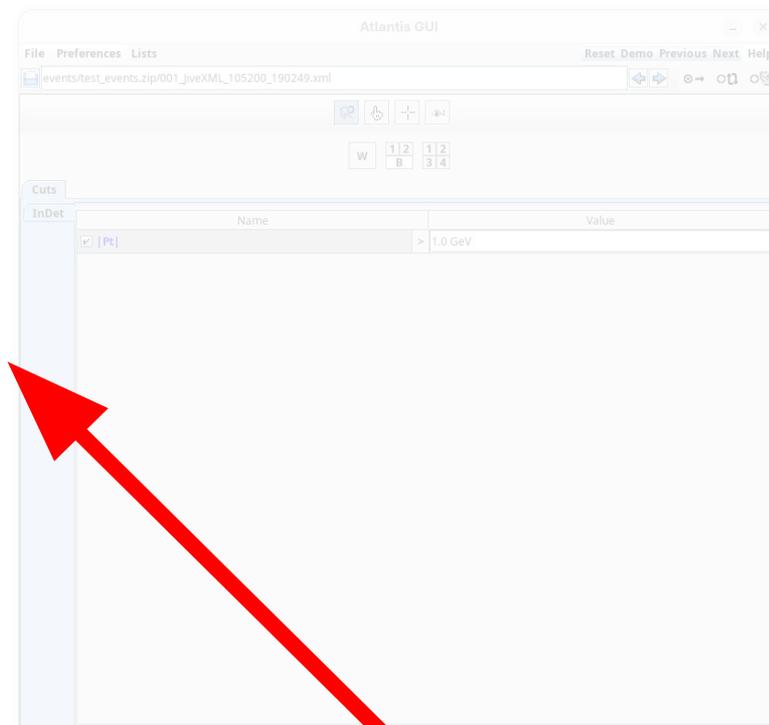
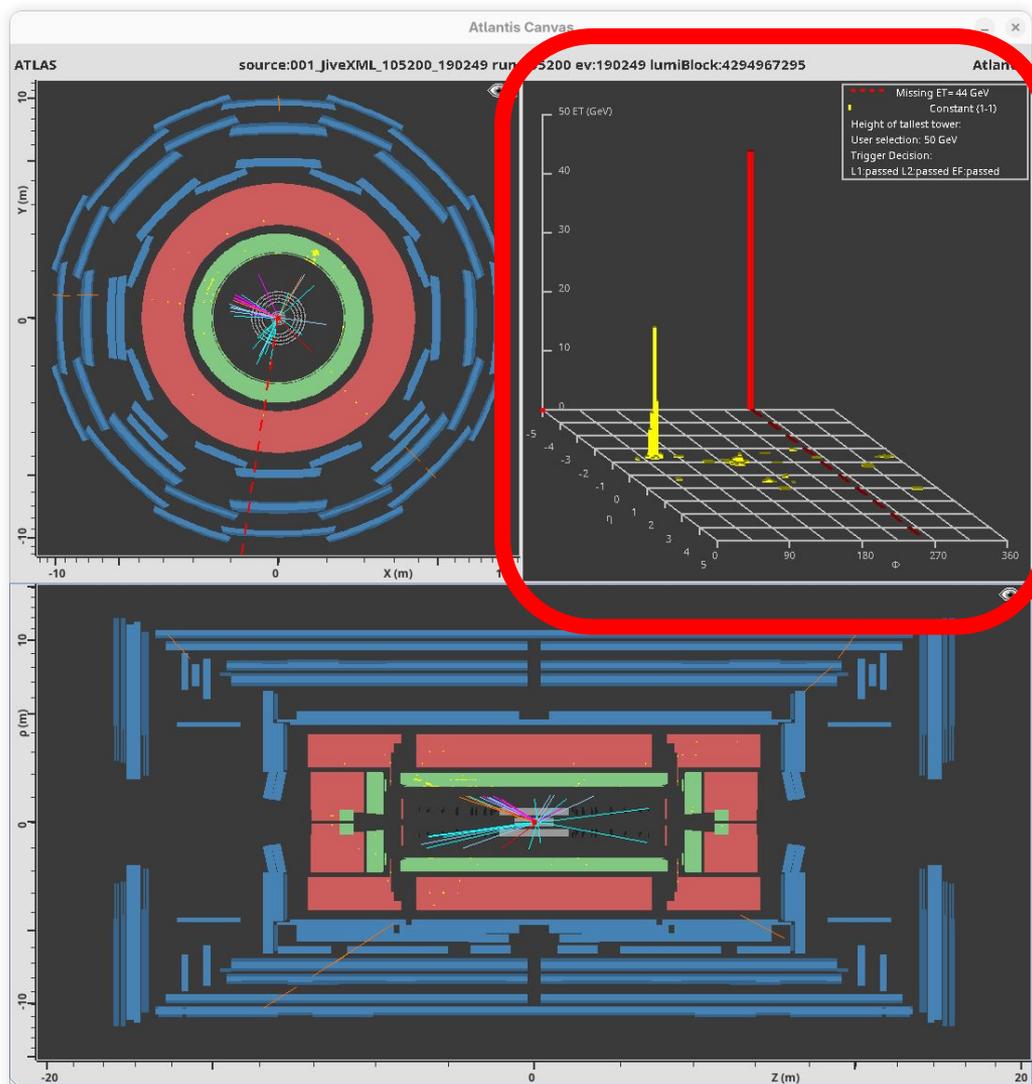


Widok detektora od strony lecącego protonu (rzut na płaszczyznę XY)

Program MINERVA

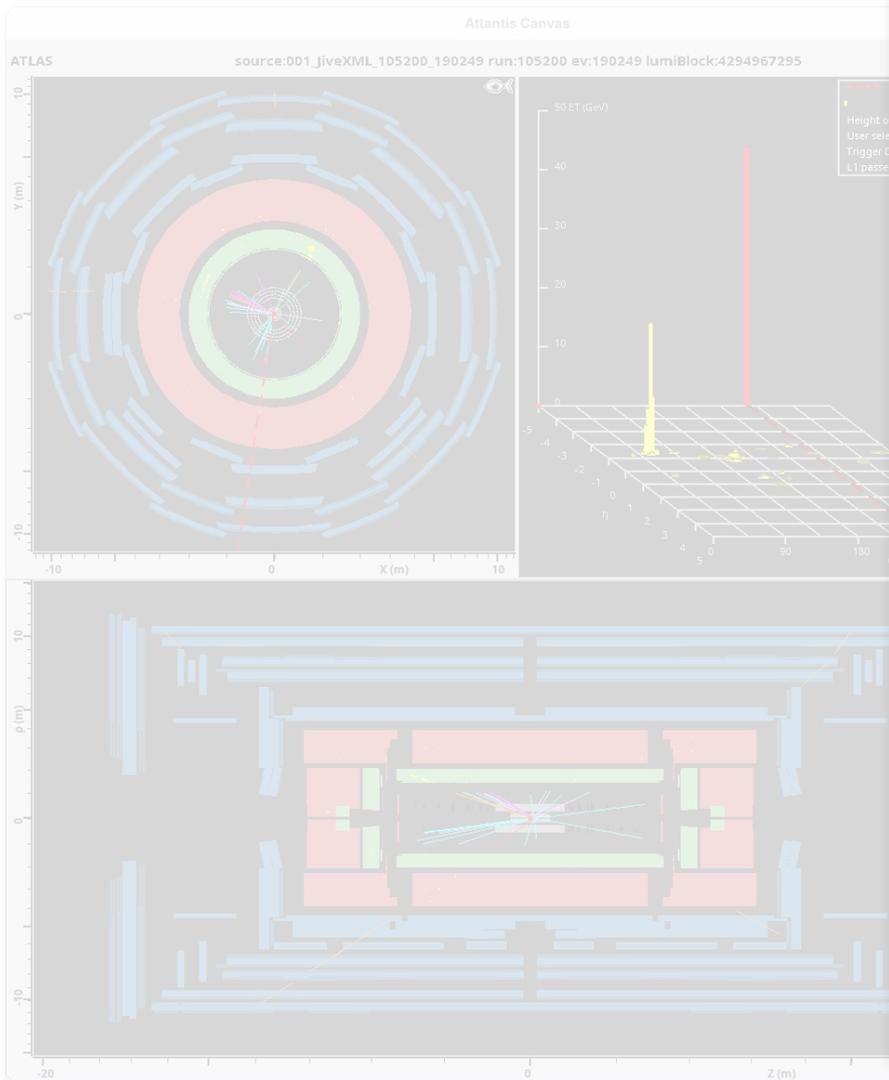


Program MINERVA



Odczyt energii cząstek z kalorymetrów (żółty) oraz brakującej energii (MET, czerwony)

Program MINERVA



Atlantis GUI

File Preferences Lists Reset Demo Previous Next Help

events/test_events.zip/001_JiveXML_105200_190249.xml

W 1 2 1 2
B 3 4 3 4

Cuts	Name	Value
InDet	Pt	1.0 GeV

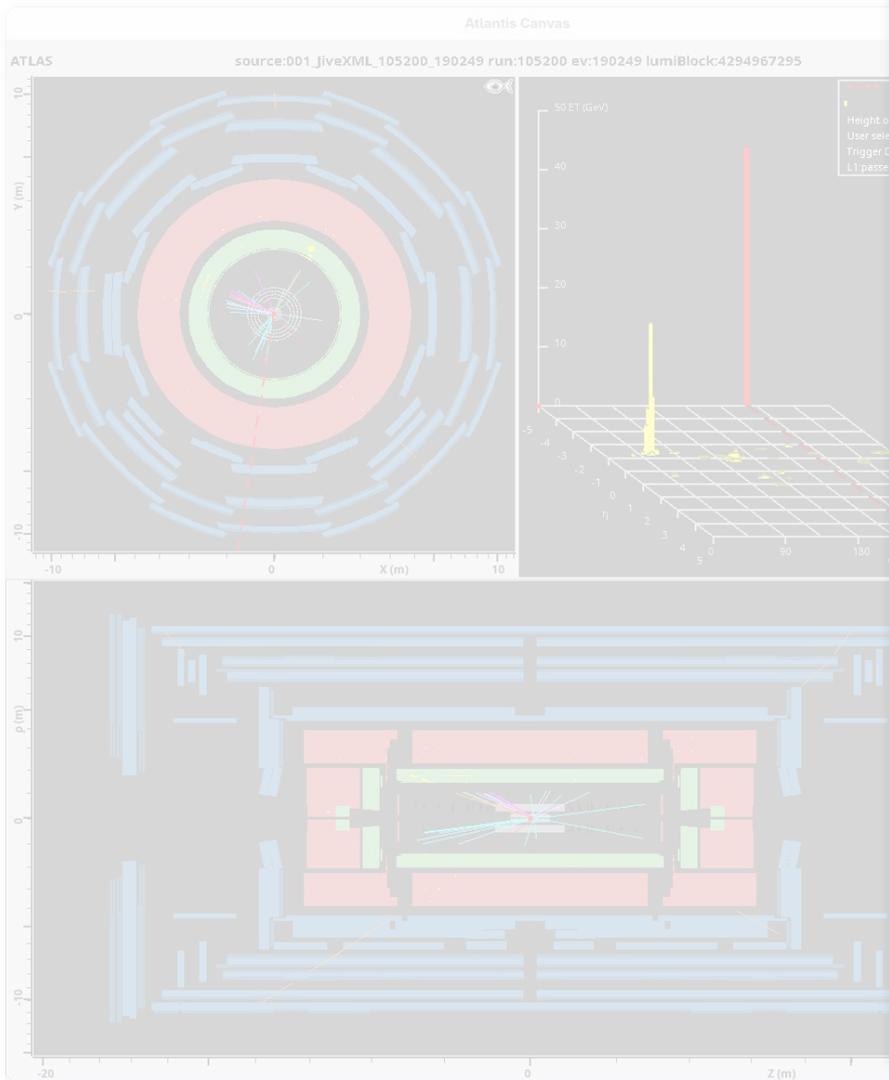
Menu przypadków

Welcome to Atlantis !

001_JiveXML_105200_190249.xml (10520000190249)

The screenshot shows the Atlantis GUI interface. A red box highlights the top menu bar. A red arrow points to a menu icon in the top toolbar, labeled 'Menu przypadków'. Below the toolbar is a table of cuts, with the 'InDet' section containing a cut named '|Pt|' with a value of '1.0 GeV'. The bottom of the window displays a welcome message and the current event file name.

Program MINERVA



Atlantis GUI

File Preferences Lists Reset Demo Previous Next Help

events/test_events.zip/001_JiveXML_105200_190249.xml

W B 3 4

Cuts	Name	Value
InDet	<input checked="" type="checkbox"/> Pt	10.0 GeV

W B 3 4

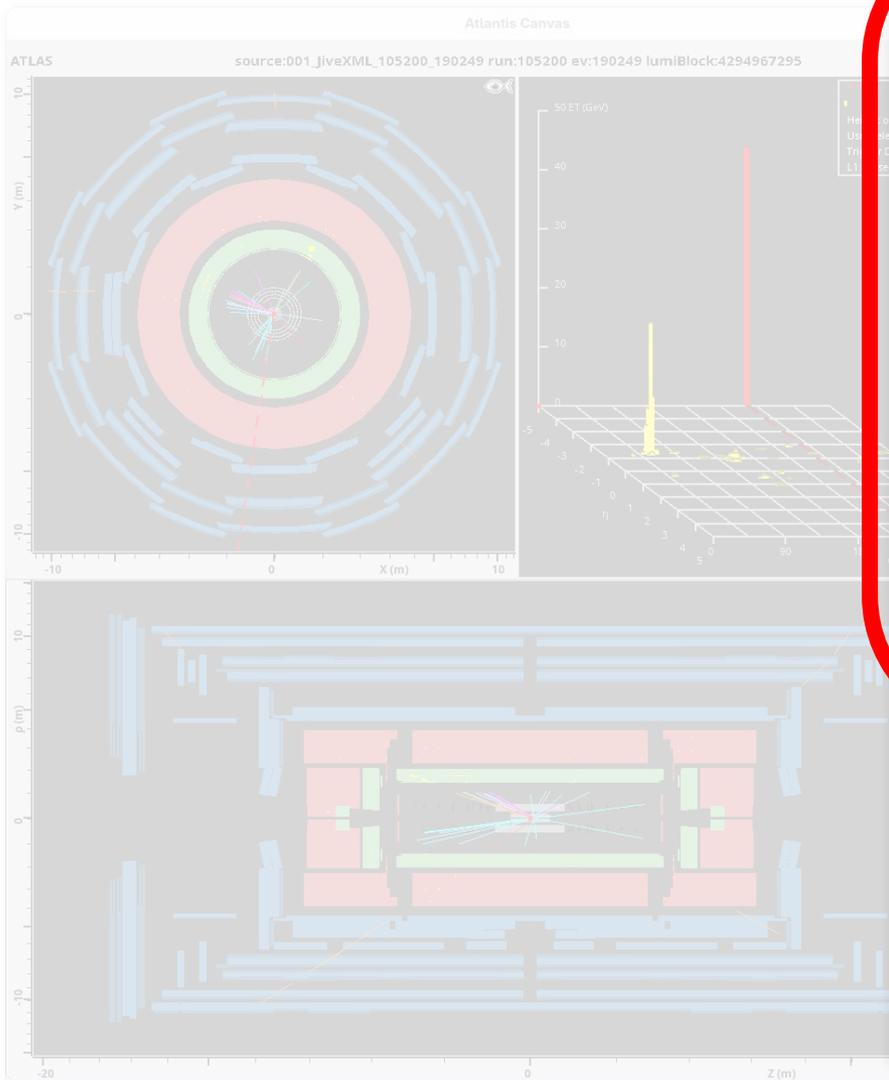
Welcome to Atlantis !

001_JiveXML_105200_190249.xml (10520000190249)

Wybór kursora

The screenshot shows the Atlantis GUI interface. A red box highlights the cursor selection tool in the top toolbar. A red arrow points from the text 'Wybór kursora' to the cursor selection tool. The Cuts panel shows a table with one entry: Pt with a value of 10.0 GeV. The bottom panel shows a welcome message and the current event file name.

Program MINERVA



Atlantis GUI

File Preferences Lists Reset Demo Previous Next Help

events/test_events.zip/001_jiveXML_105200_190249.xml

W B 3 4

InDet	Name	Value
<input checked="" type="checkbox"/>	Pt	> 1.0 GeV

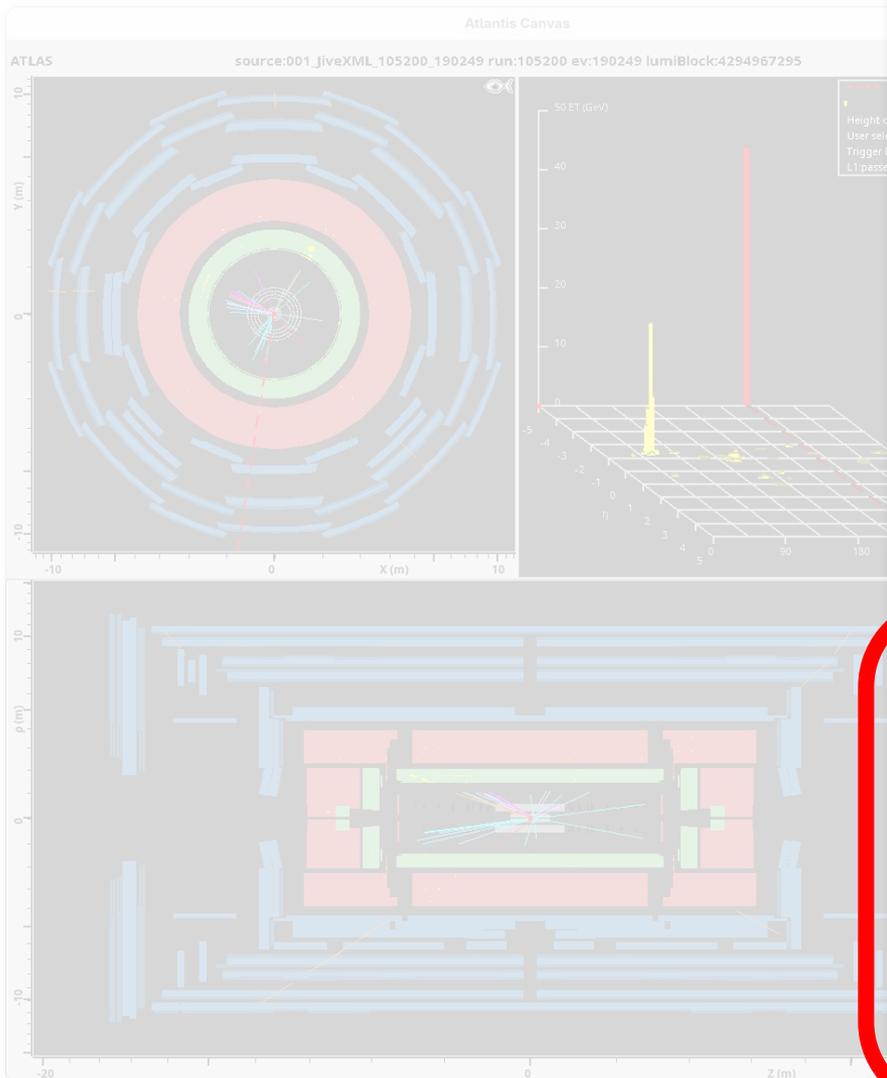
Menu cięć na ślady cząstek

Welcome to Atlantis !

001_jiveXML_105200_190249.xml (10520000190249)

The image shows the Atlantis GUI interface. The 'Cuts' menu is open, showing a table of cuts for the 'InDet' detector. The table has three columns: 'InDet', 'Name', and 'Value'. The first row shows a checked checkbox, the name '|Pt|', and the value '> 1.0 GeV'. The text 'Menu cięć na ślady cząstek' is overlaid on the table. Below the table, the text 'Welcome to Atlantis !' and the file path '001_jiveXML_105200_190249.xml (10520000190249)' are visible.

Program MINERVA



Atlantis GUI

File Preferences Lists

Reset Demo Previous Next Help

events/test_events.zip/001_jiveXML_105200_190249.xml

W 1 2 1 2
B 3 4 3 4

Cuts

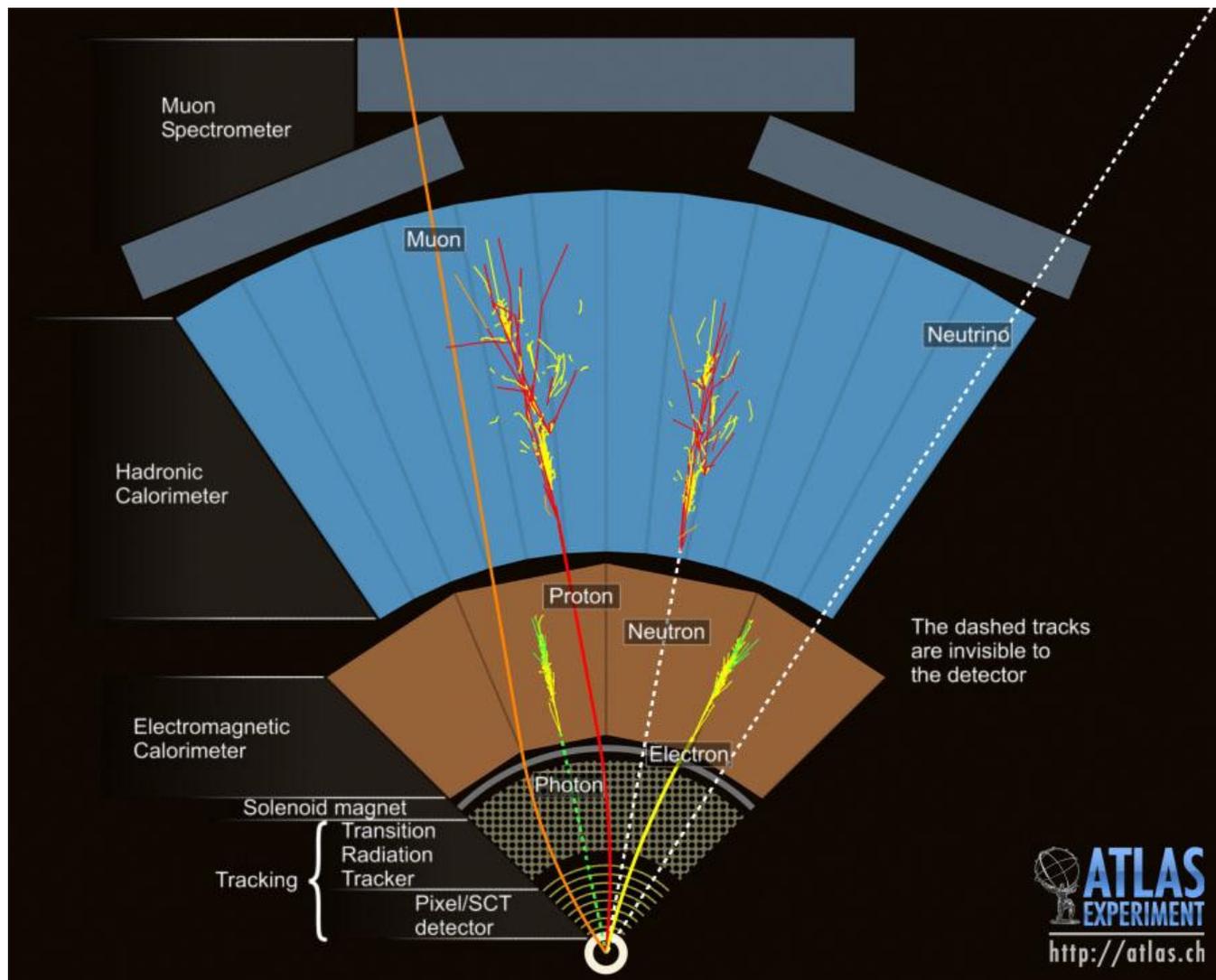
InDet	Name	Value
<input checked="" type="checkbox"/>	Pt	> 1.0 GeV

Informacje o wybranym śladzie

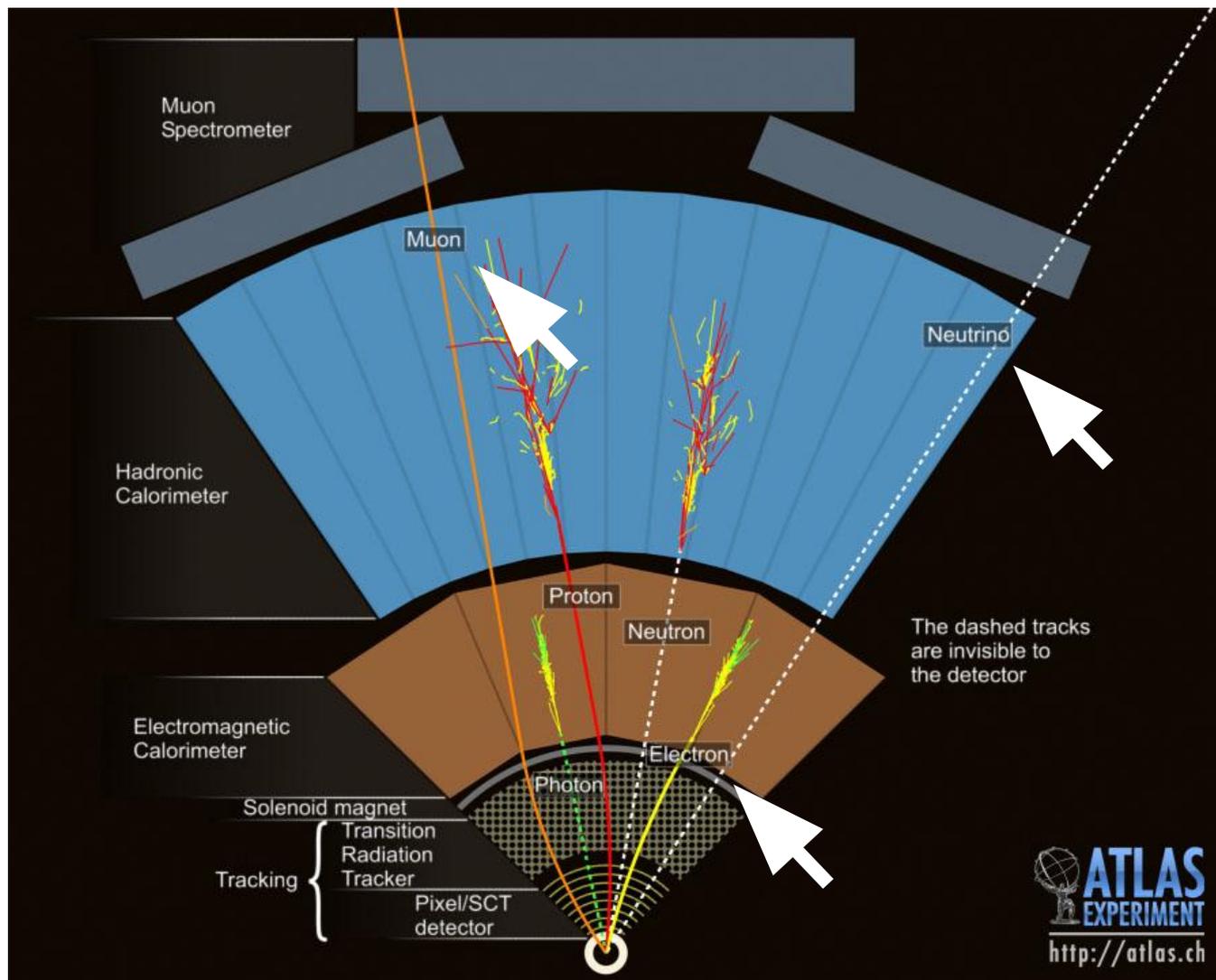
InDetTrack index: 44	
PT = 2.163 GeV	← Pęd poprzeczny
$\eta = -1.297$	← Pseudopospiesznosc (kąt polarny)
$\Phi = 359.437^\circ$	← Kąt azymutalny
Px = 2.163 GeV	
Py = -0.021 GeV	
Pz = -3.662 GeV	
Charge = 1	← Znak ładunku
Isolation = 0.00	← Miara "osamotnienia" śladu

Identyfikacja cząstek

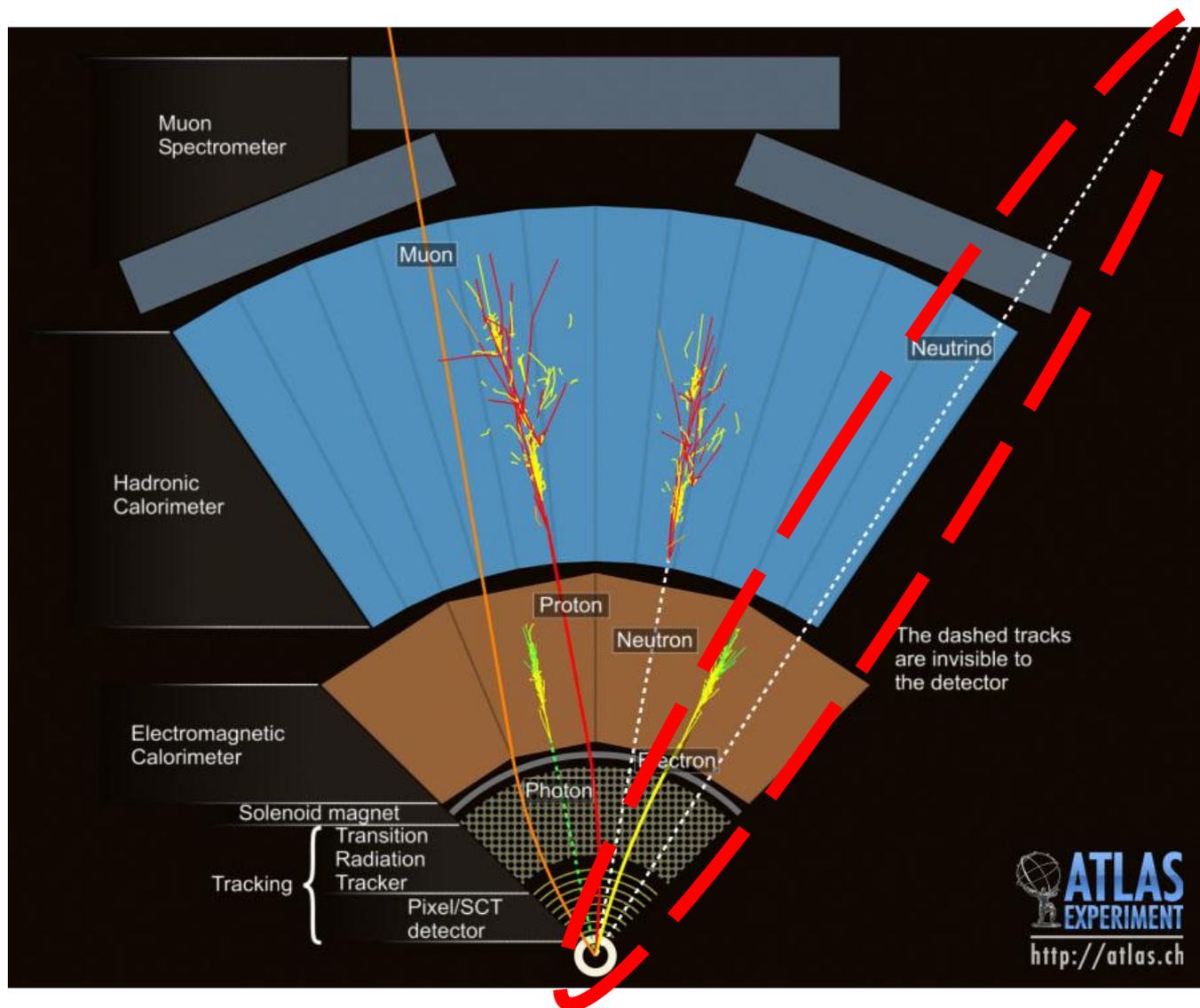
Detekcja i identyfikacja cząstek w ATLASie



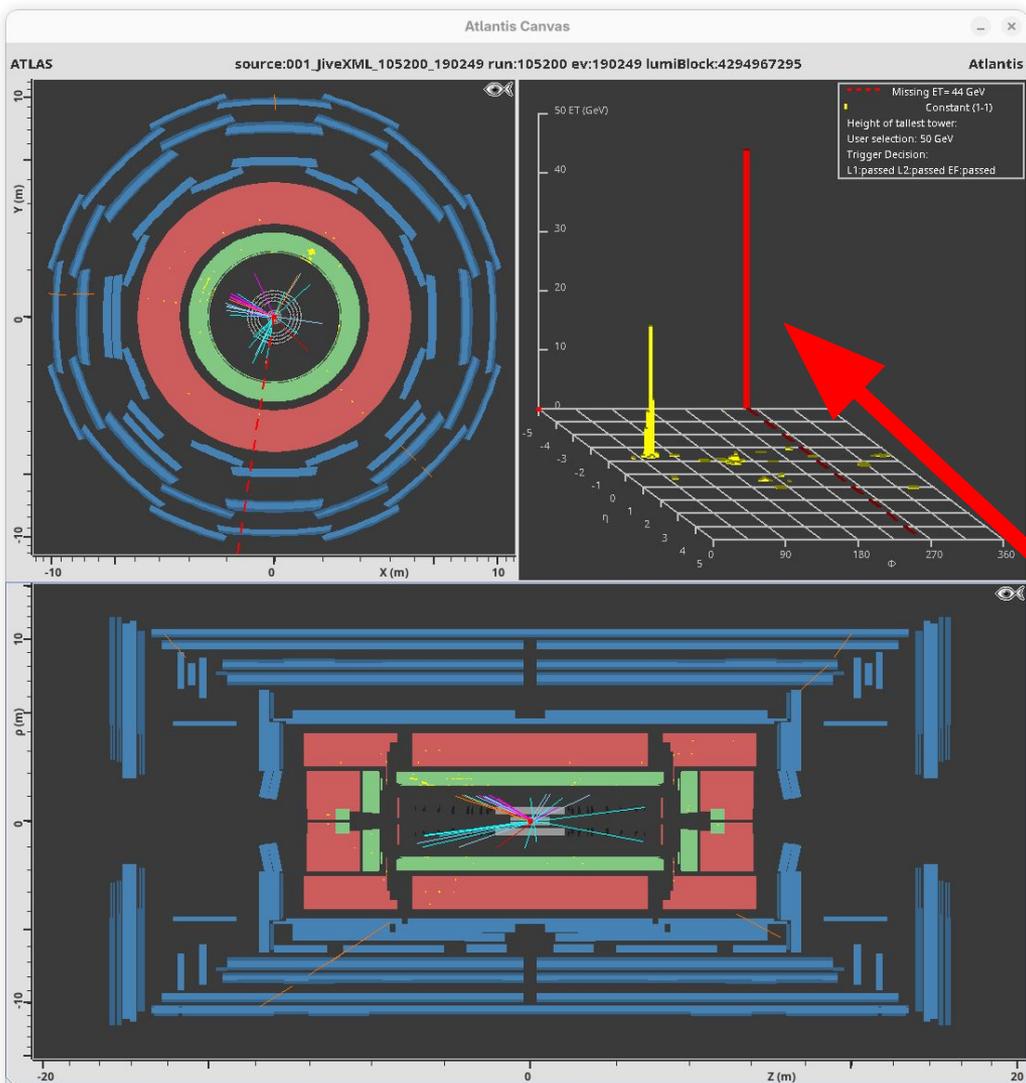
Detekcja i identyfikacja cząstek w ATLASie



Detekcja i identyfikacja cząstek – neutrino



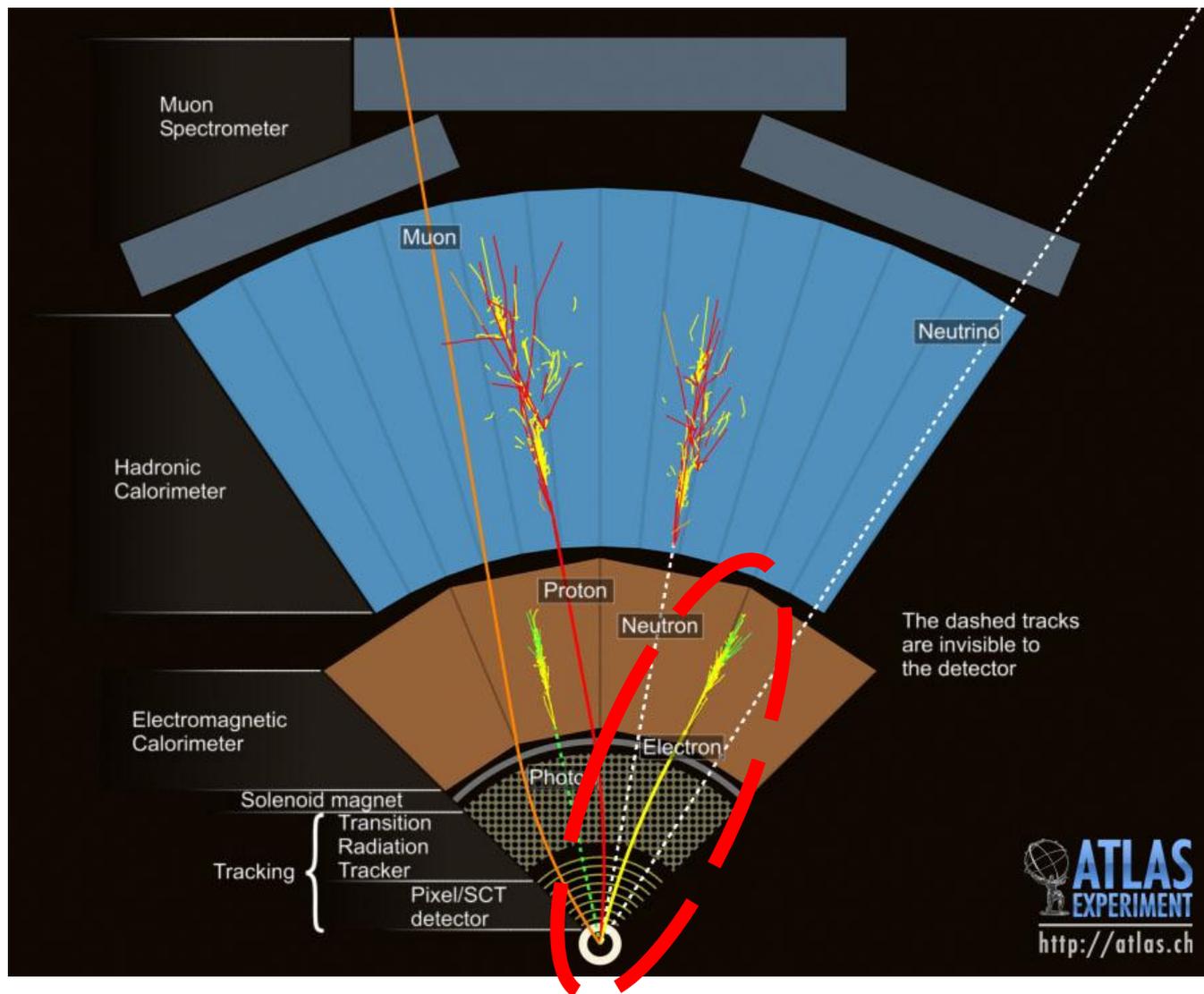
Detekcja i identyfikacja cząstek – neutrino



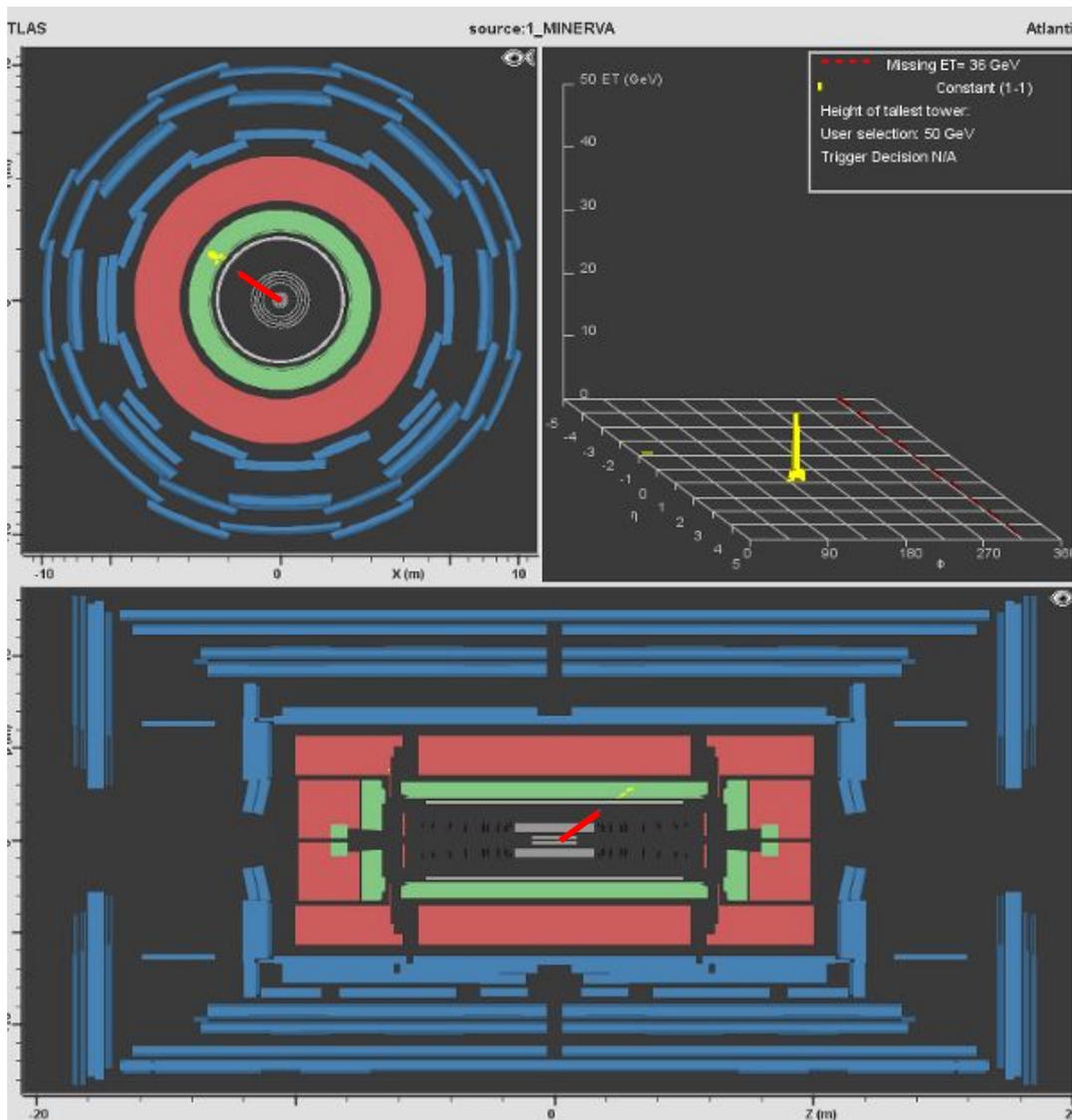
Odczyt energii cząstek z kalorymetrów (żółty) oraz **brakującej energii (MET, czerwony)**

Duży MET = neutrino

Detekcja i identyfikacja cząstek – elektron/pozyton



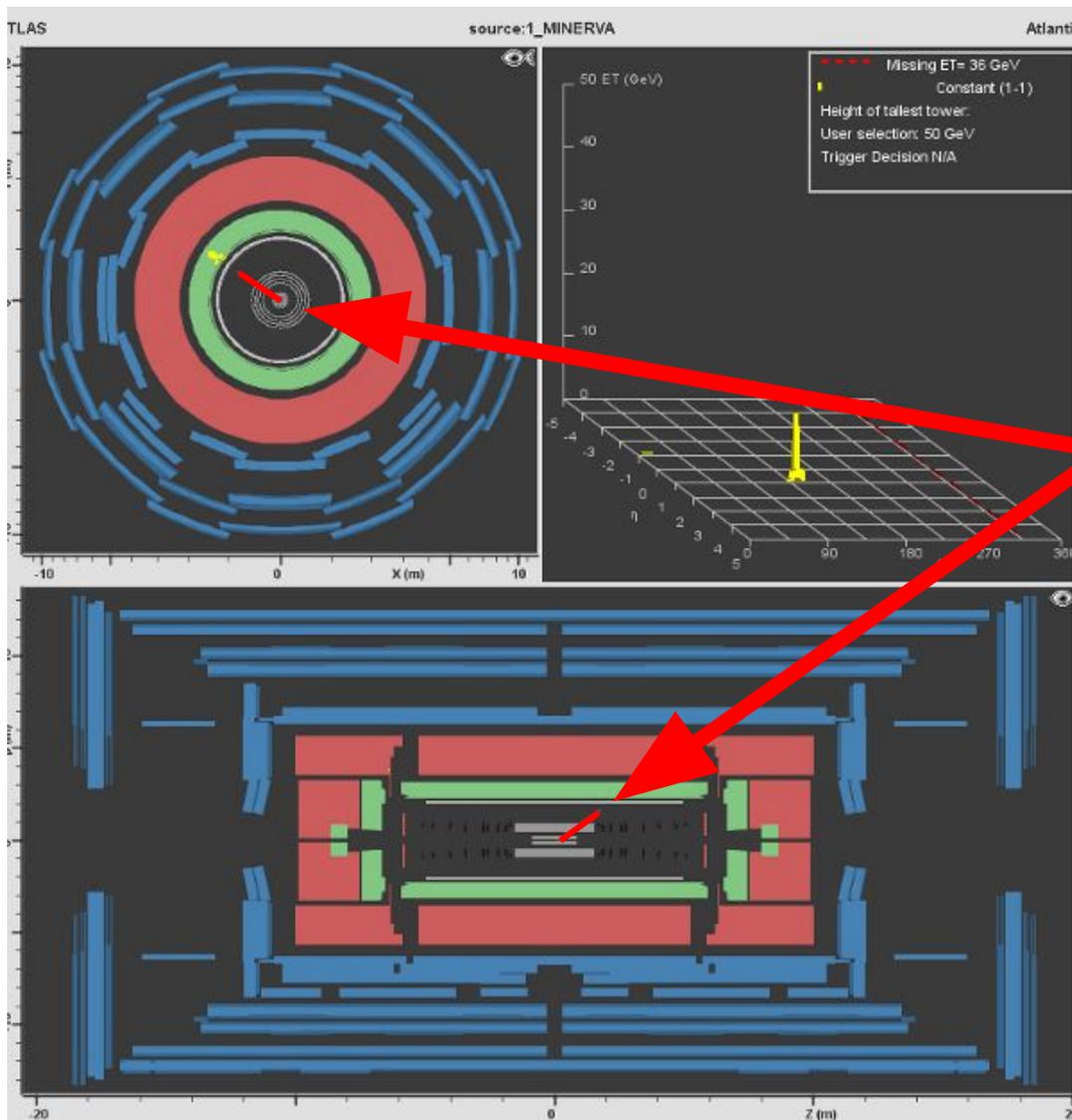
Detekcja i identyfikacja cząstek – elektron/pozyton



Elektron:

- ślad w detektorze?
- depozyt energii w kalorymetrze EM na przedłużeniu śladu?

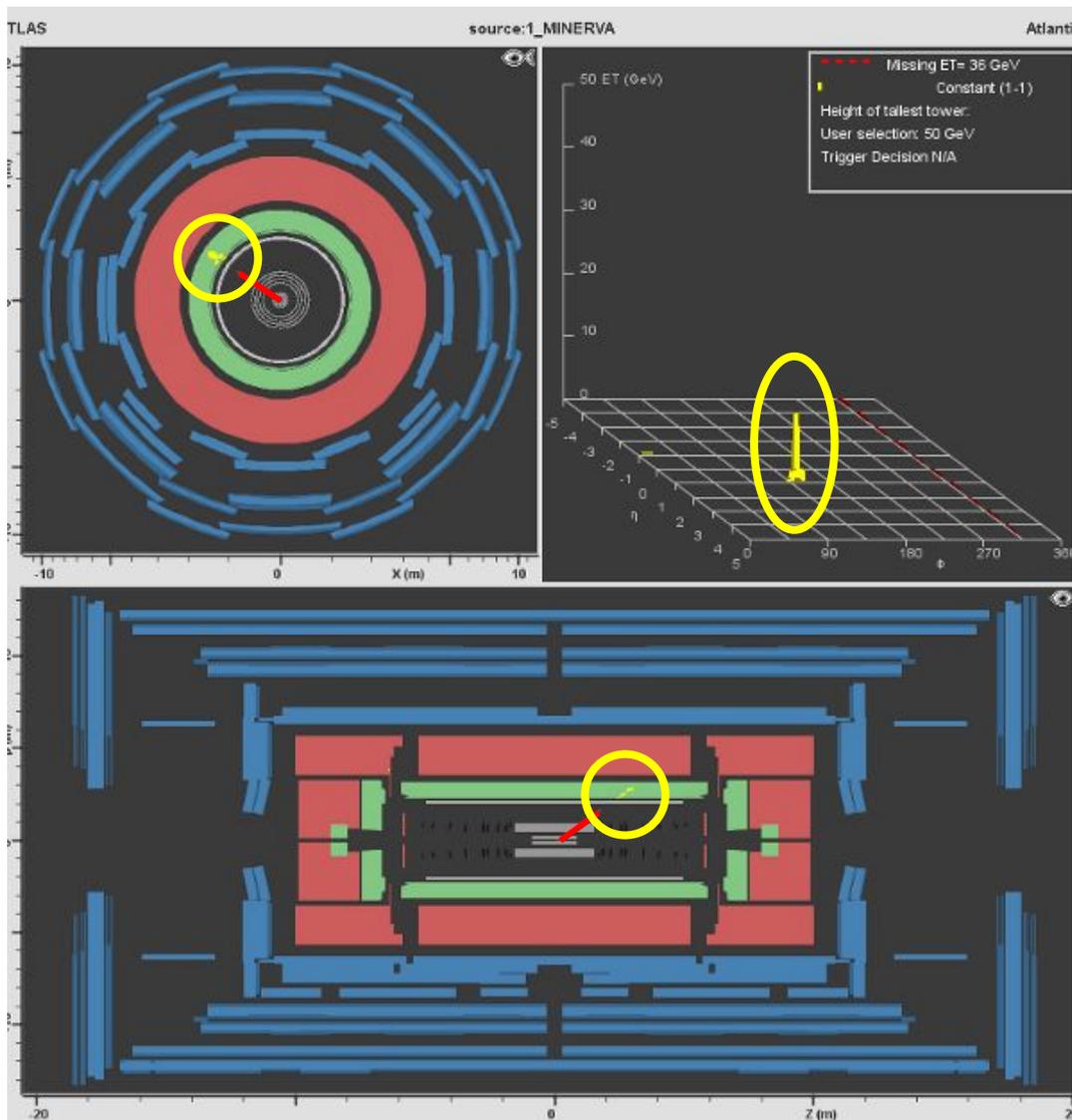
Detekcja i identyfikacja cząstek – elektron/pozyton



Elektron:

- ślad w detektorze!
- depozyt energii w kalorymetrze EM na przedłużeniu śladu?

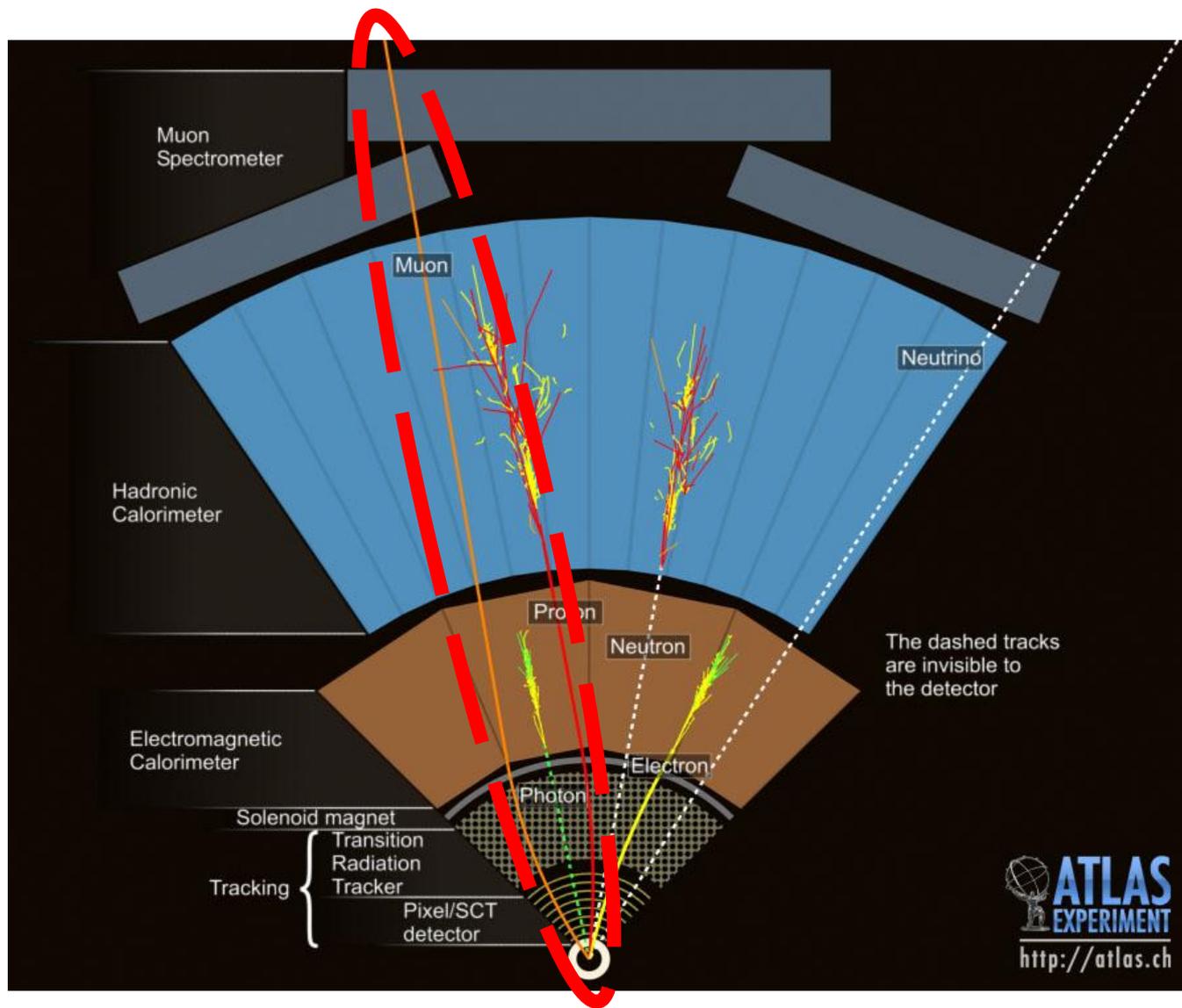
Detekcja i identyfikacja cząstek – elektron/pozyton



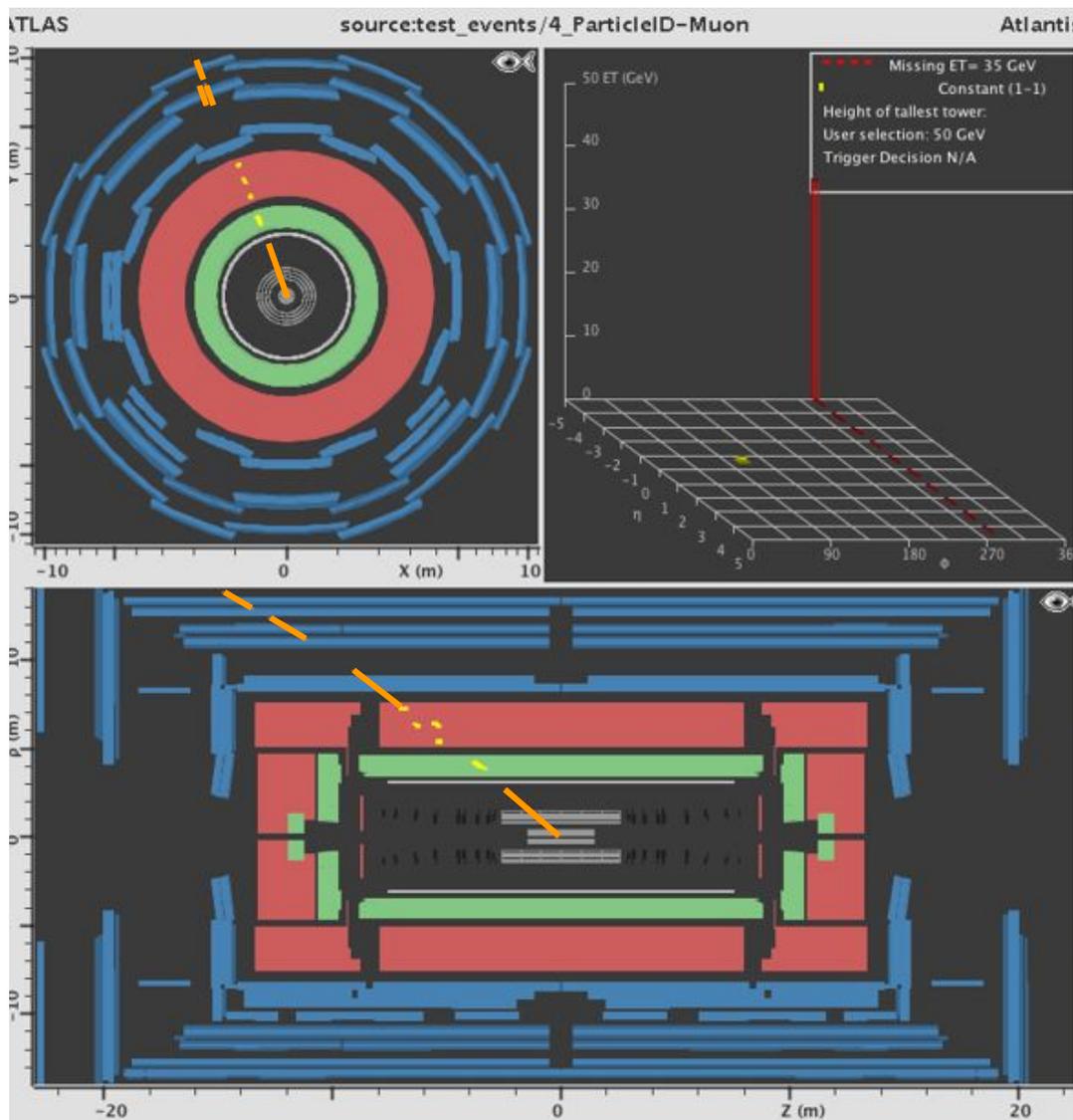
Elektron:

- ślad w detektorze!
- depozyt energii w kalorymetrze EM na przedłużeniu śladu!

Detekcja i identyfikacja cząstek – mion/anty-mion



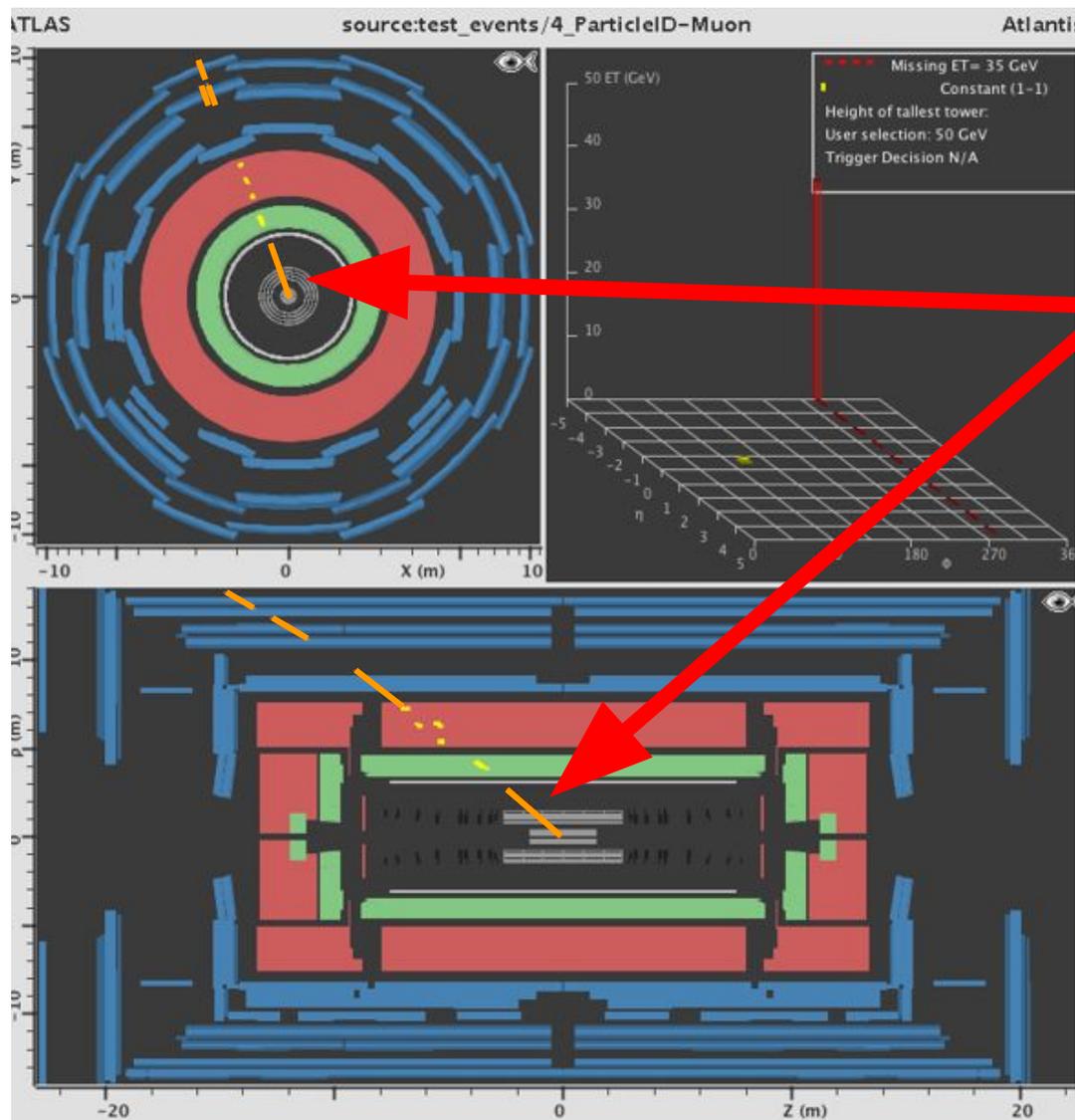
Detekcja i identyfikacja cząstek – mion/anty-mion



Mion:

- ślad w detektorze?
- brak znaczącego depozytu energii w kalorymetrach na przedłużeniu śladu?
- ślad w detektorze mionowym na przedłużeniu?

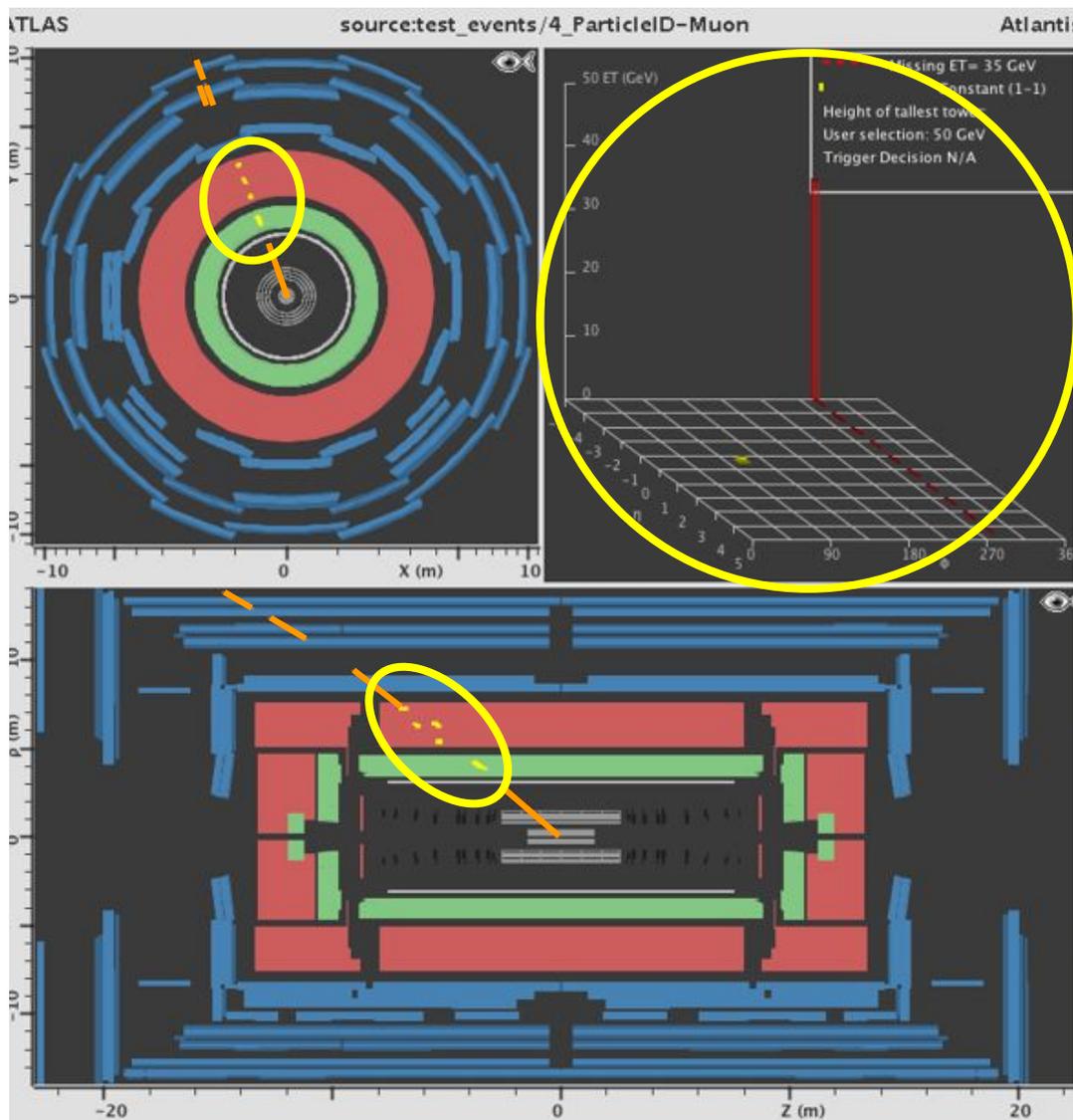
Detekcja i identyfikacja cząstek – mion/anty-mion



Mion:

- ślad w detektorze!
- brak znaczącego depozytu energii w kalorymetrach na przedłużeniu śladu?
- ślad w detektorze mionowym na przedłużeniu?

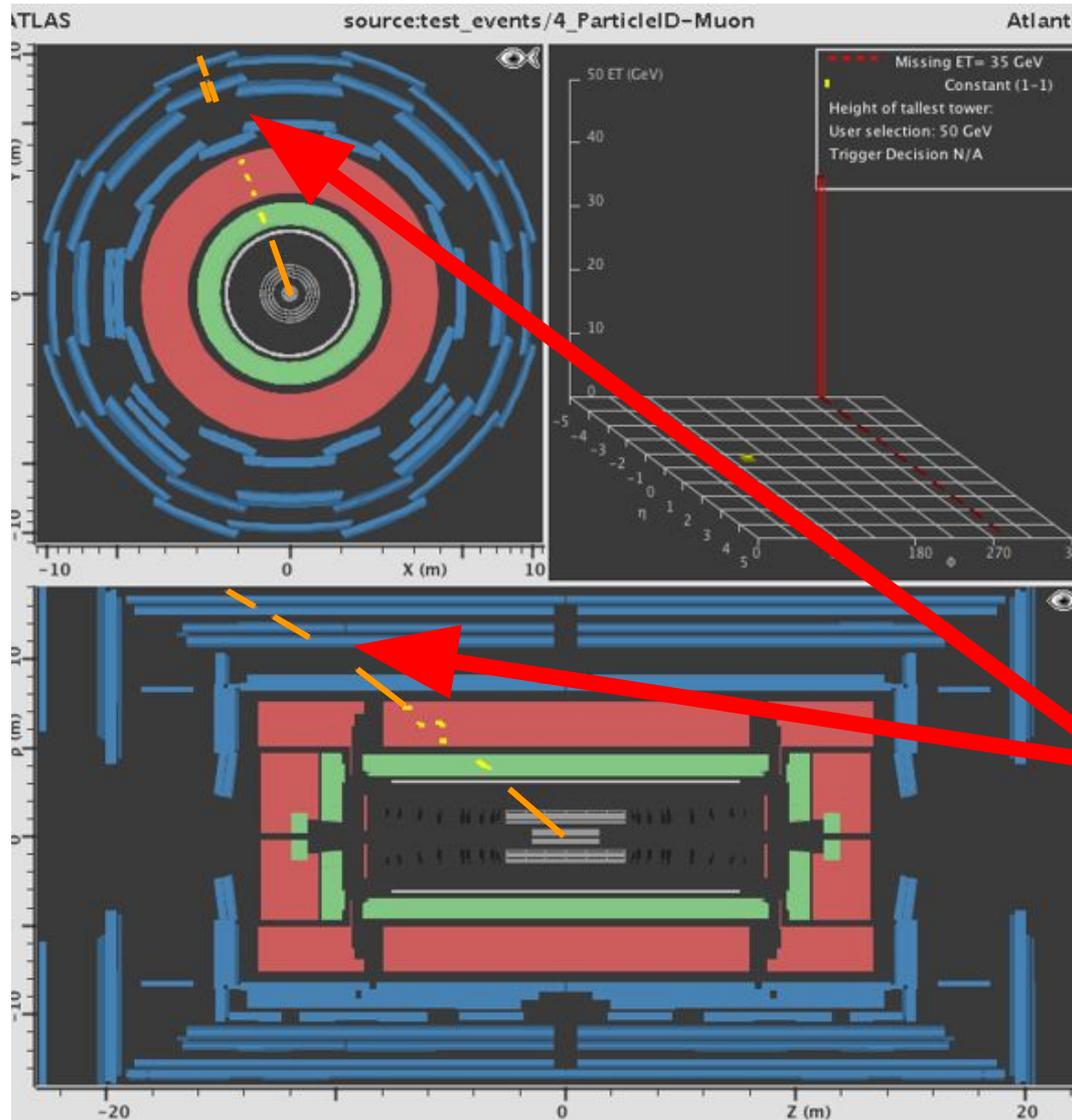
Detekcja i identyfikacja cząstek – mion/anty-mion



Mion:

- ślad w detektorze!
- brak znaczącego depozytu energii w kalorymetrach na przedłużeniu śladu!
- ślad w detektorze mionowym na przedłużeniu?

Detekcja i identyfikacja cząstek – mion/anty-mion

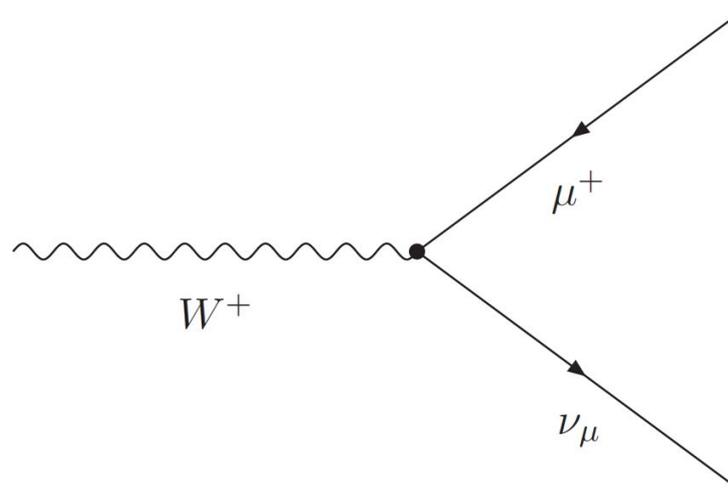
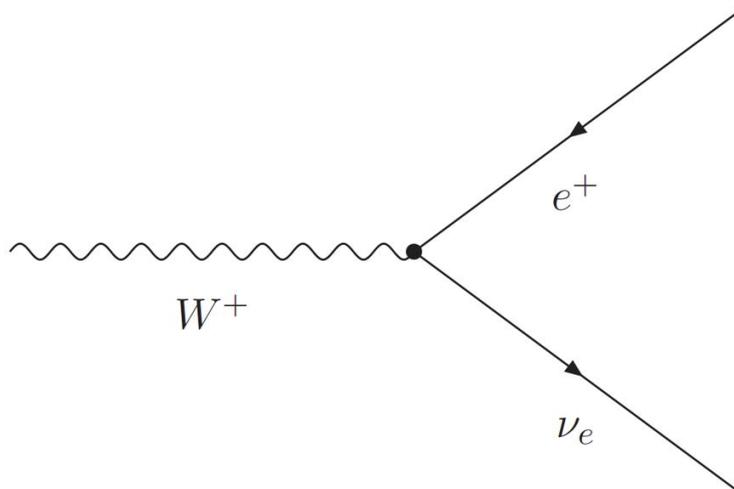
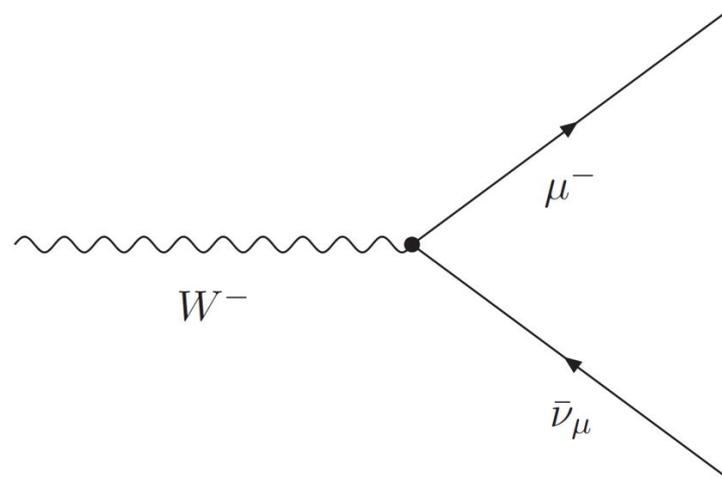
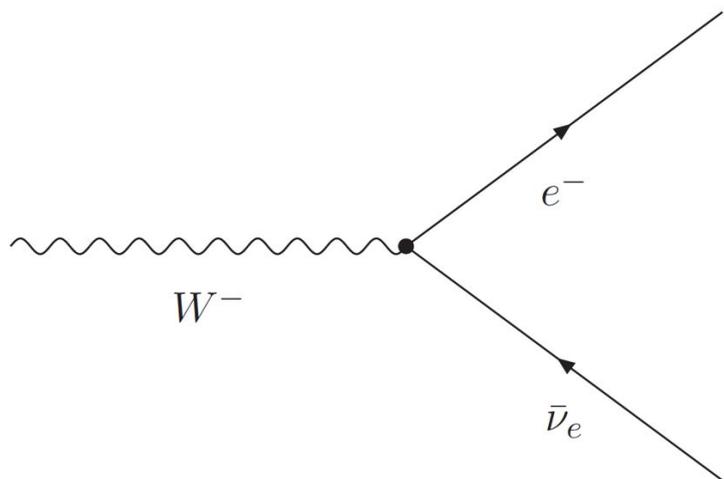


Mion:

- ślad w detektorze!
- brak znaczącego depozytu energii w kalorymetrach na przedłużeniu śladu!
- ślad w detektorze mionowym na przedłużeniu!

Identyfikacja przypadków

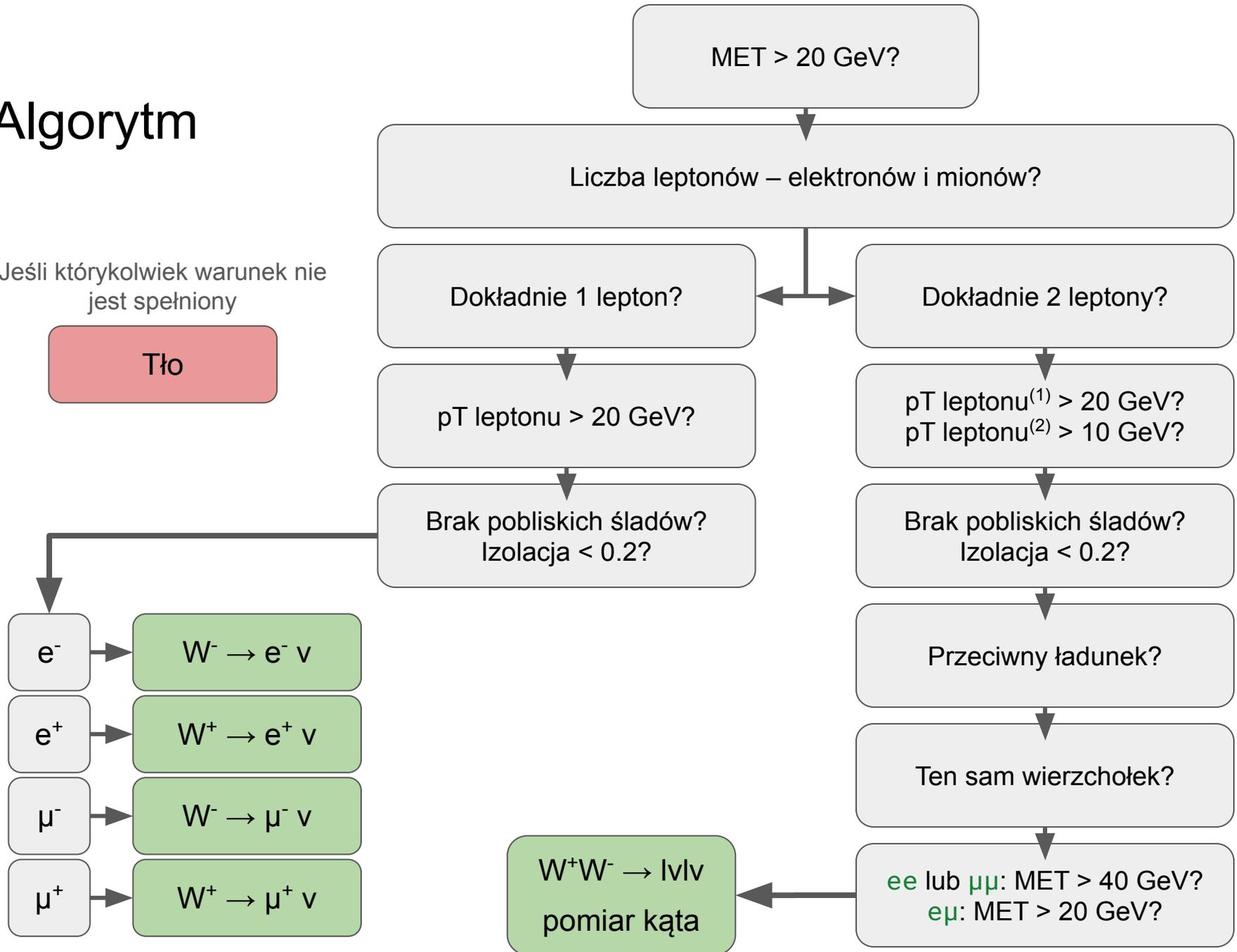
Rozpad bozonu W – sygnał



Algorytm

Jeśli którykolwiek warunek nie jest spełniony

Tło



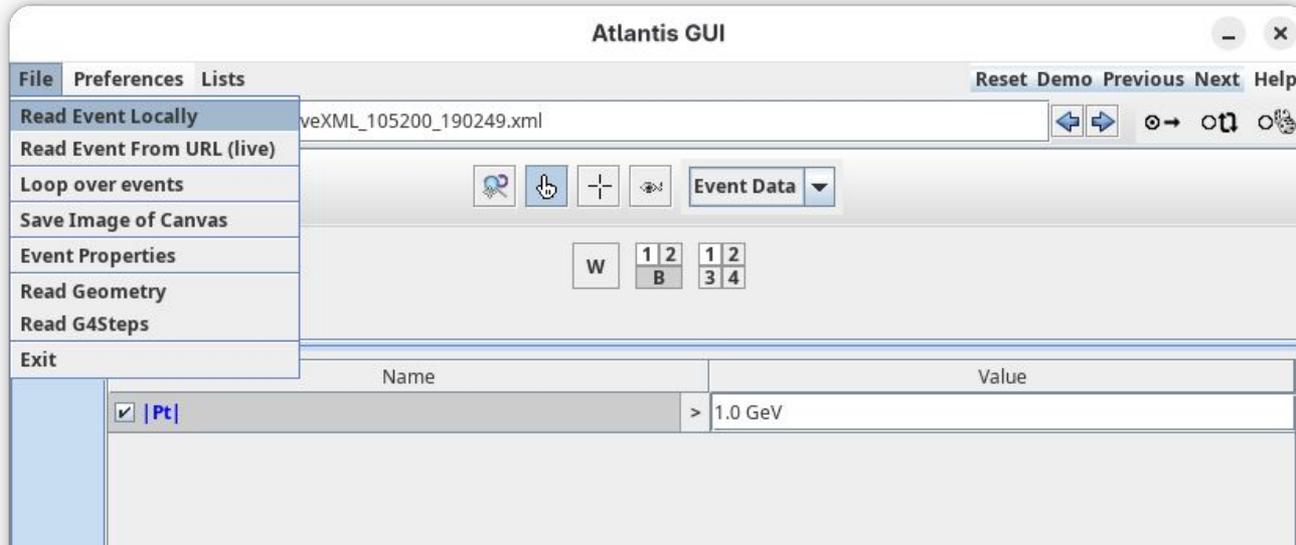
Zapis wyników

ATLAS data analysis

data sample: 5B

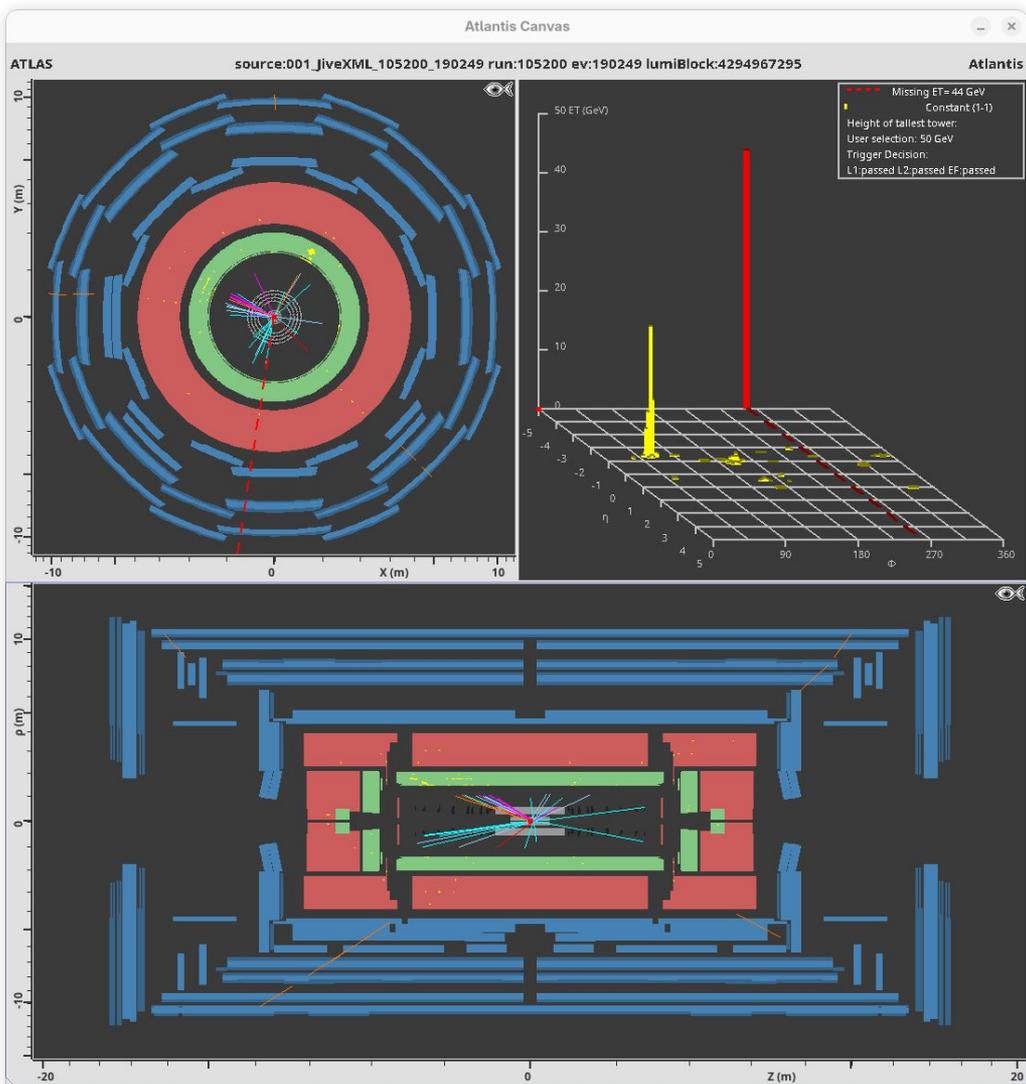
event number	signal with 1 lepton (I)				signal with 2 leptons (II)		Back-ground	Comment
	$W \rightarrow \nu + \dots$		$W \rightarrow \nu + \dots$		$WW \rightarrow l^+ \nu l^- \nu$	$\Delta\phi_{ll}$ round off to whole number		
	e^+	e^-	μ^+	μ^-				
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								
..								

Wczytywanie przypadków



- **File > Read Event Locally**
- Nawigujemy do folderu: **Desktop > Datasets**
- Wybieramy plik: **<Twoja grupa>.zip**

Cięcie na pęd poprzeczny śladów



Atlantis GUI

File Preferences Lists Reset Demo Previous Next Help

events/test_events.zip/001_jiveXML_105200_190249.xml

Cuts

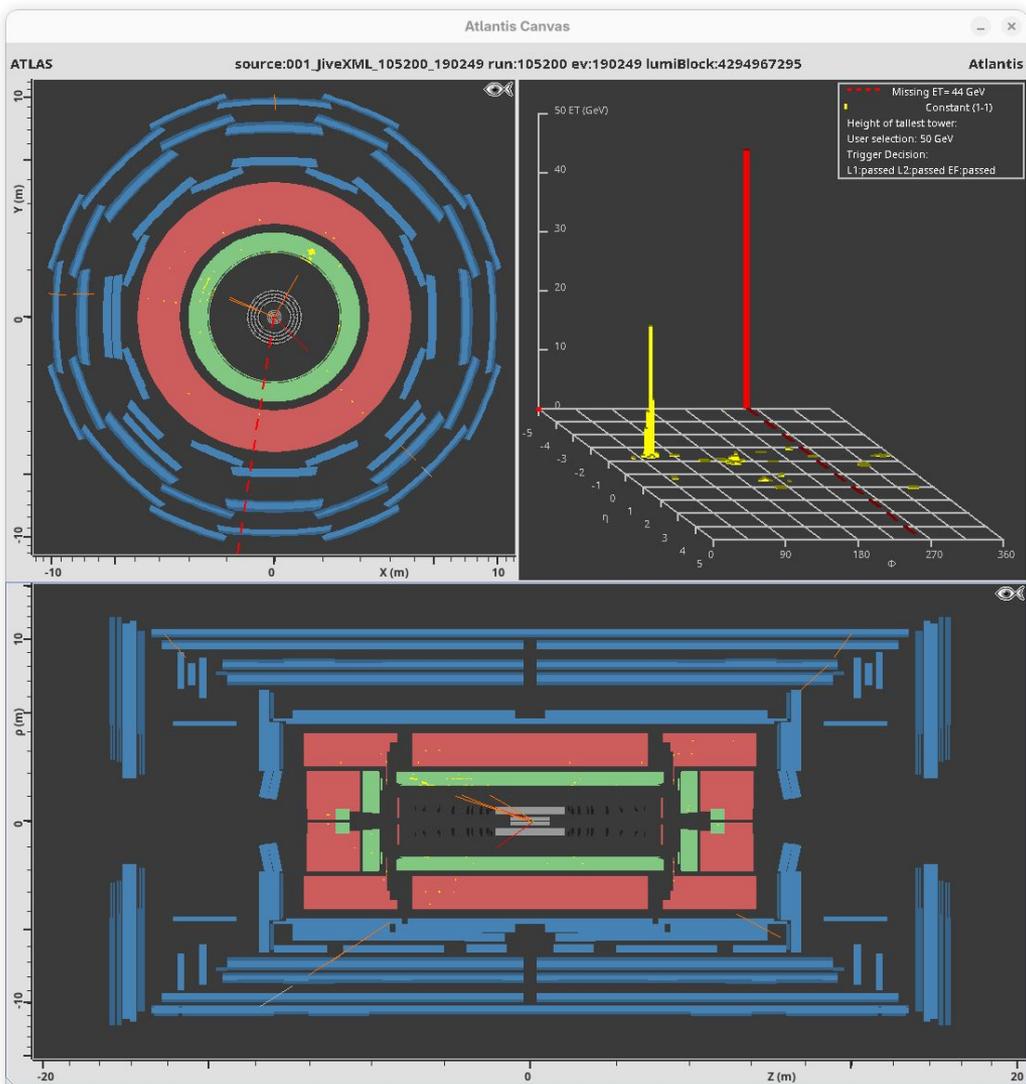
InDet	Name	Value
<input checked="" type="checkbox"/>	Pt	> 1.0 GeV

>Welcome to Atlantis !

001_jiveXML_105200_190249.xml (10520000190249)

Detailed description: The image shows the Atlantis GUI interface. A red box highlights the 'Cuts' panel, which contains a table with one entry: 'Pt' with a value of '> 1.0 GeV'. Below the table, a message says 'Welcome to Atlantis !' and the event file path is shown as '001_jiveXML_105200_190249.xml (10520000190249)'.

Cięcie na pęd poprzeczny śladów



Atlantis GUI

File Preferences Lists Reset Demo Previous Next Help

events/test_events.zip/001_jiveXML_105200_190249.xml

Cuts

InDet	Name	Value
<input checked="" type="checkbox"/>	P_T	> 1.0 GeV

>Welcome to Atlantis !

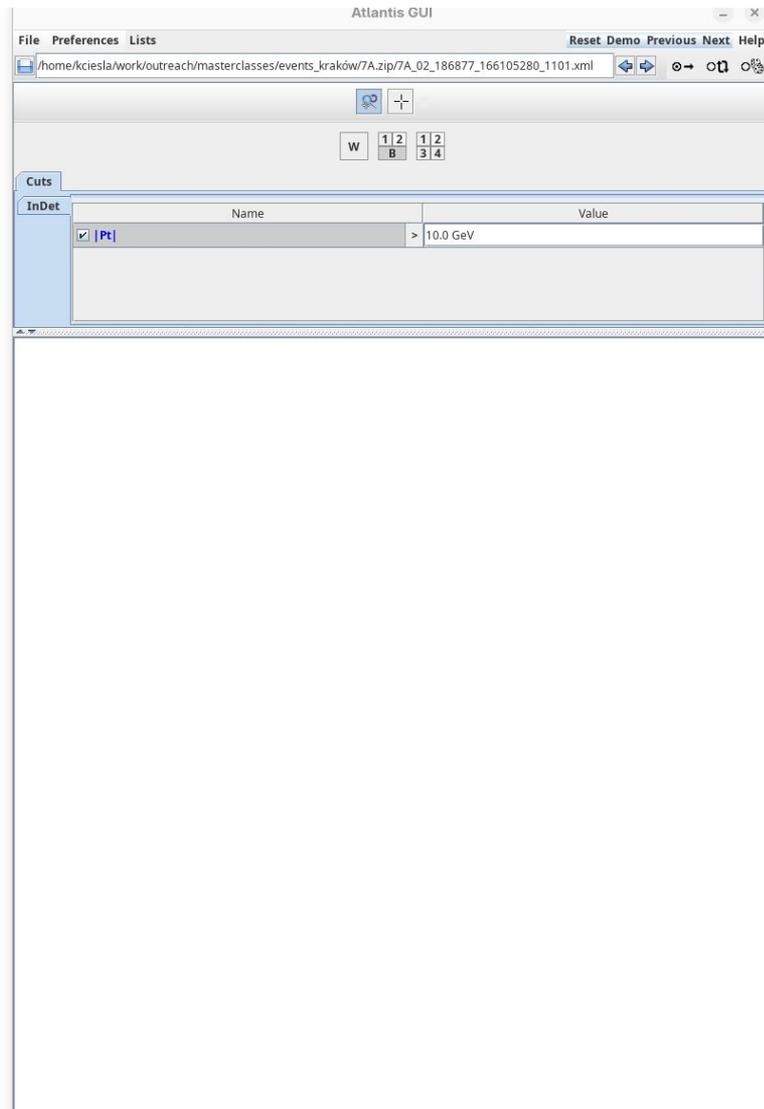
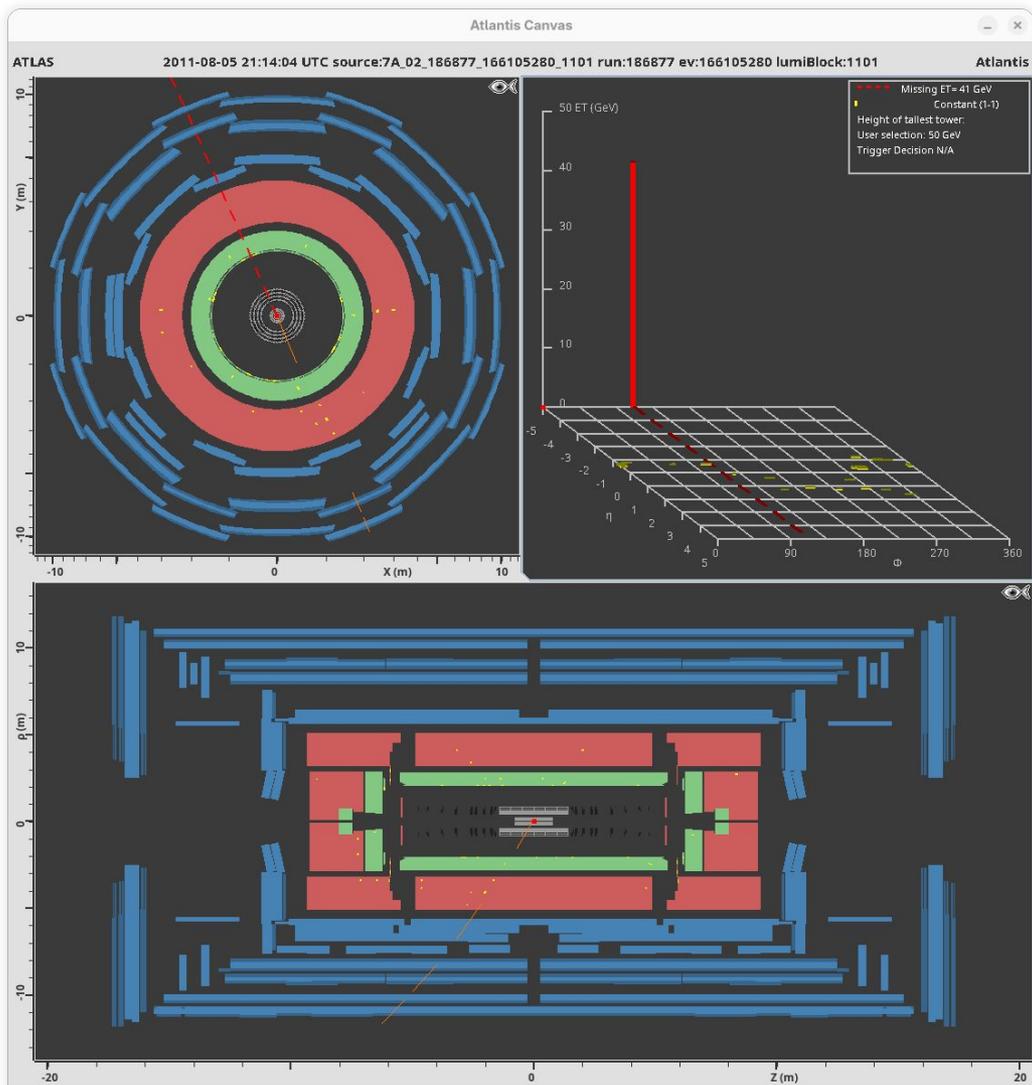
001_jiveXML_105200_190249.xml (10520000190249)

Detailed description: This screenshot shows the Atlantis GUI interface. A red box highlights the 'Cuts' panel, which contains a table with one entry: a checked box in the 'InDet' column, the name ' P_T ' in the 'Name' column, and '> 1.0 GeV' in the 'Value' column. Below the cuts panel, a status bar displays 'Welcome to Atlantis !' and the file path '001_jiveXML_105200_190249.xml (10520000190249)'.

Przykład #1

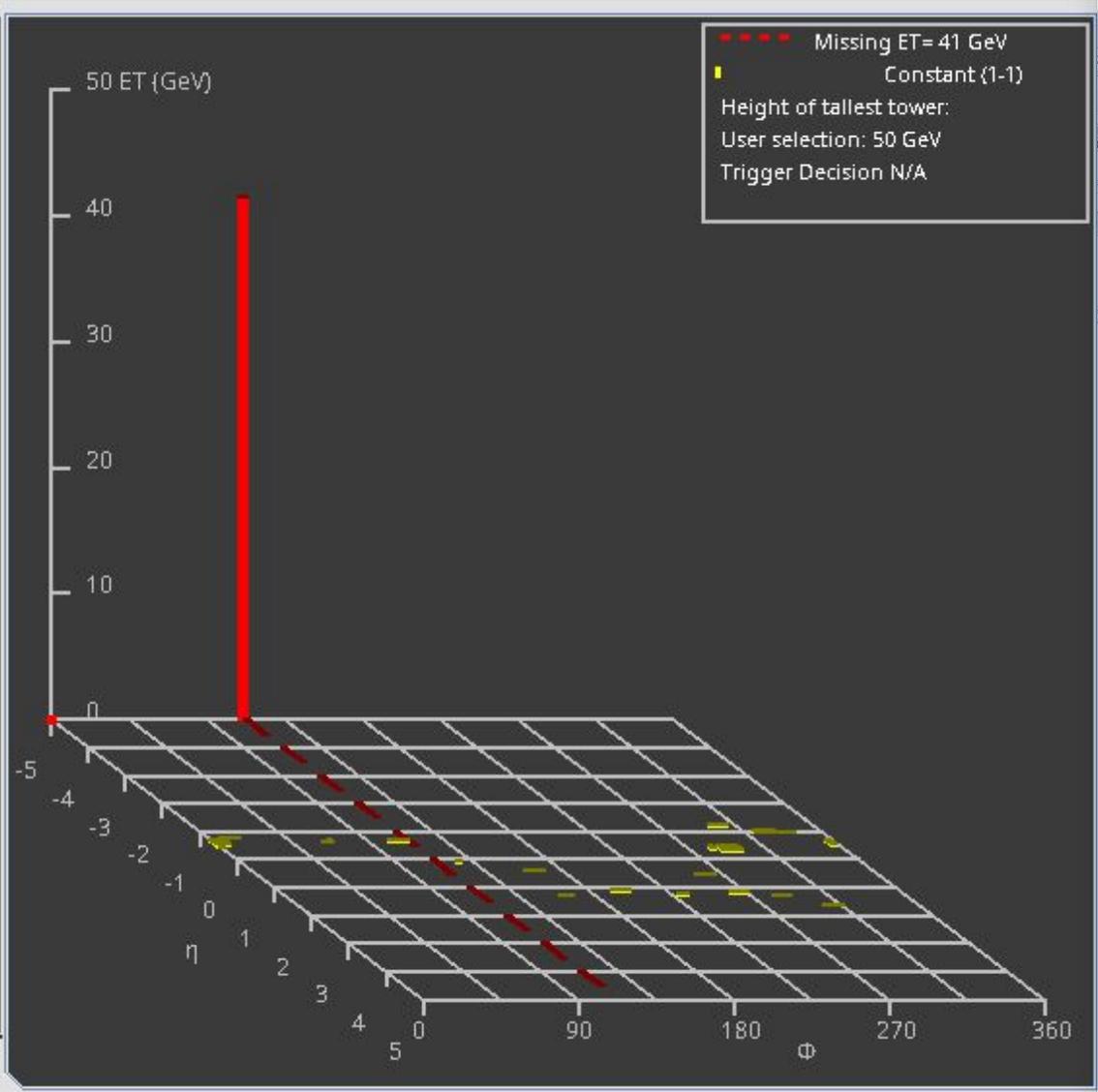
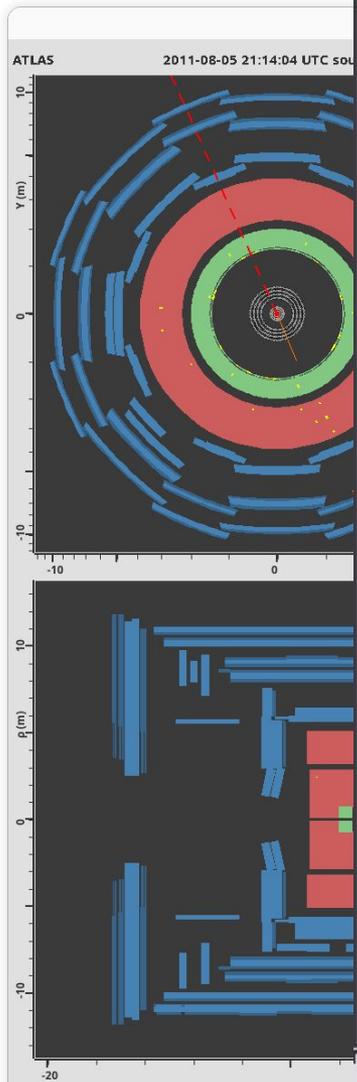
Przypadek #1

MET > 20 GeV?



Przypadek #1

MET > 20 GeV?



Reset Demo Previous Next Help

2_186877_166105280_1101.xml

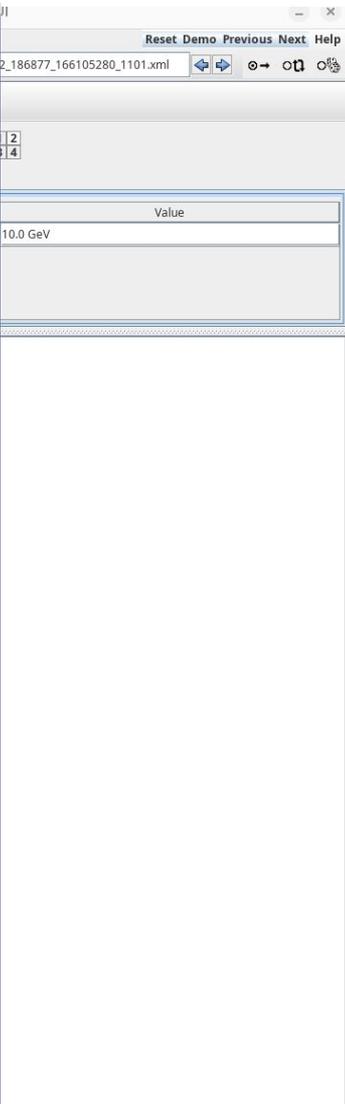
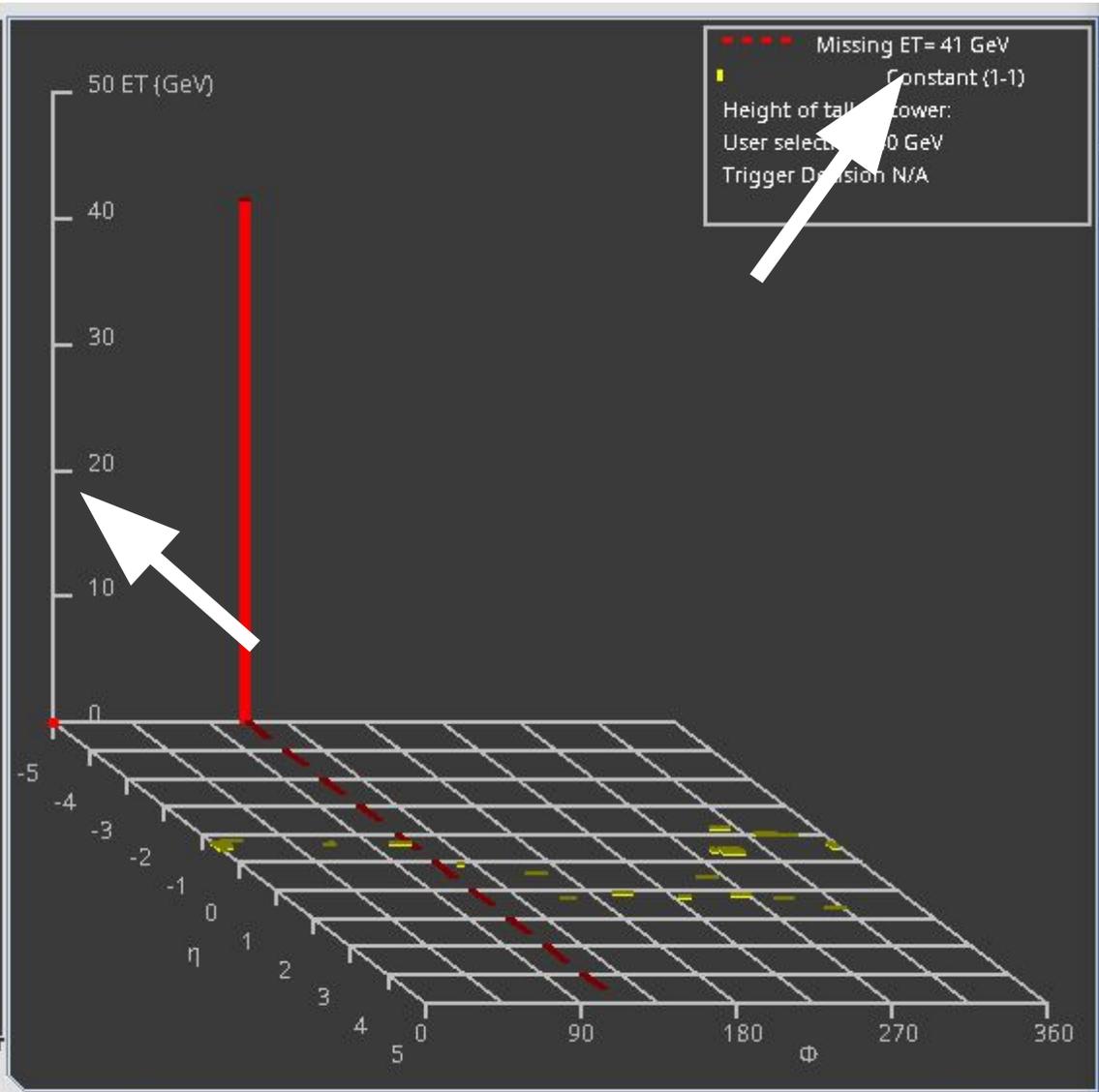
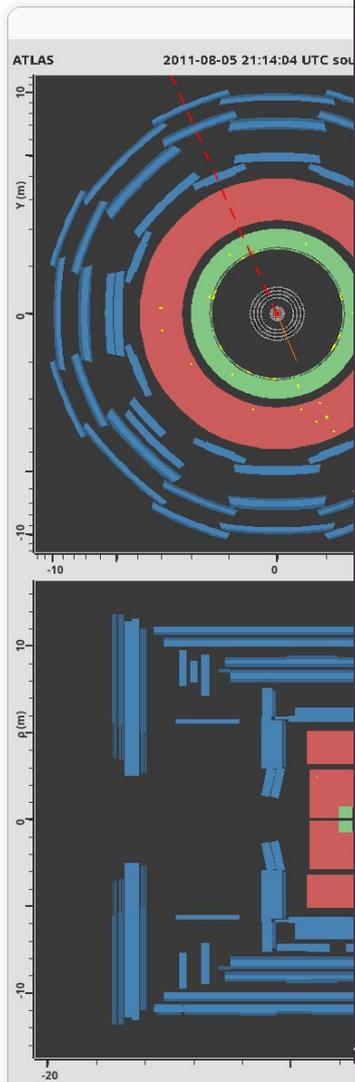
12
14

Value

10.0 GeV

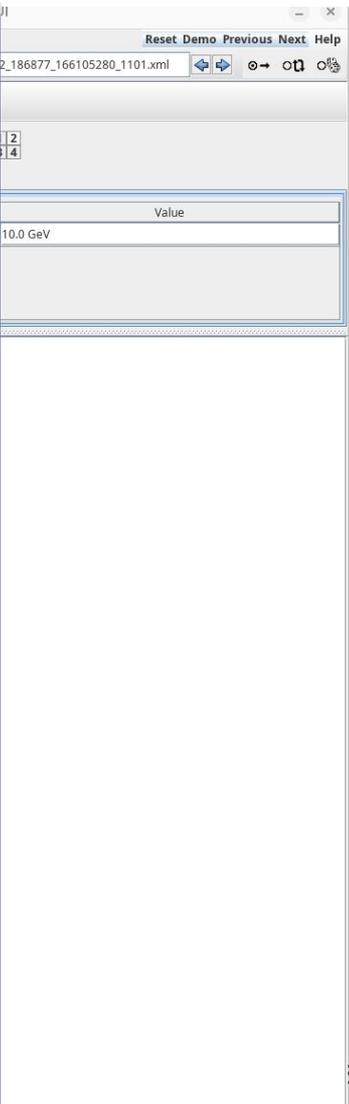
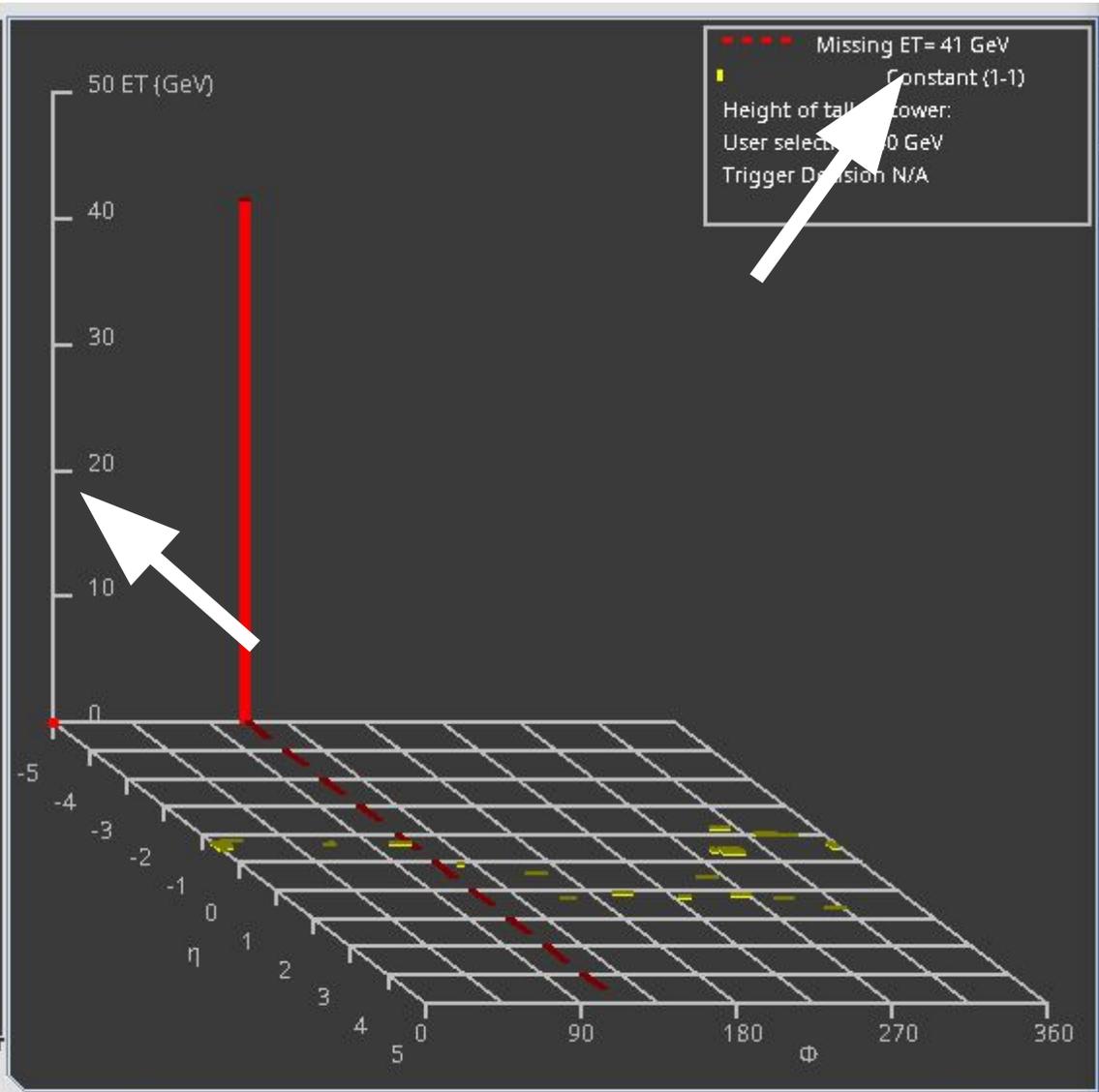
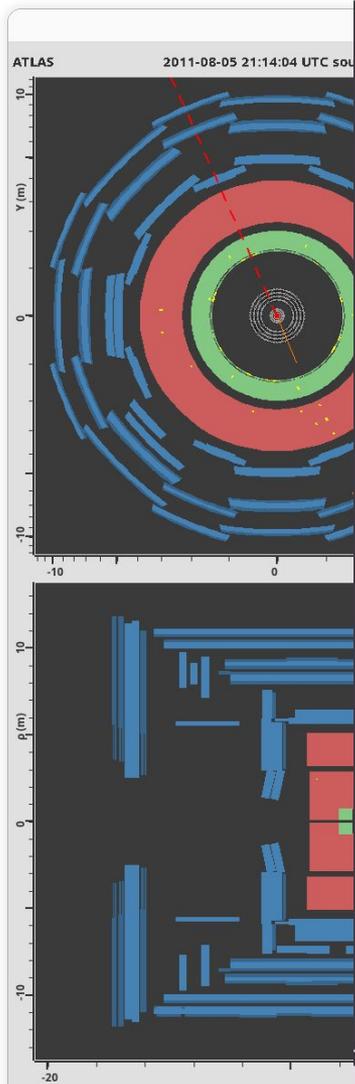
Przypadek #1

MET > 20 GeV?



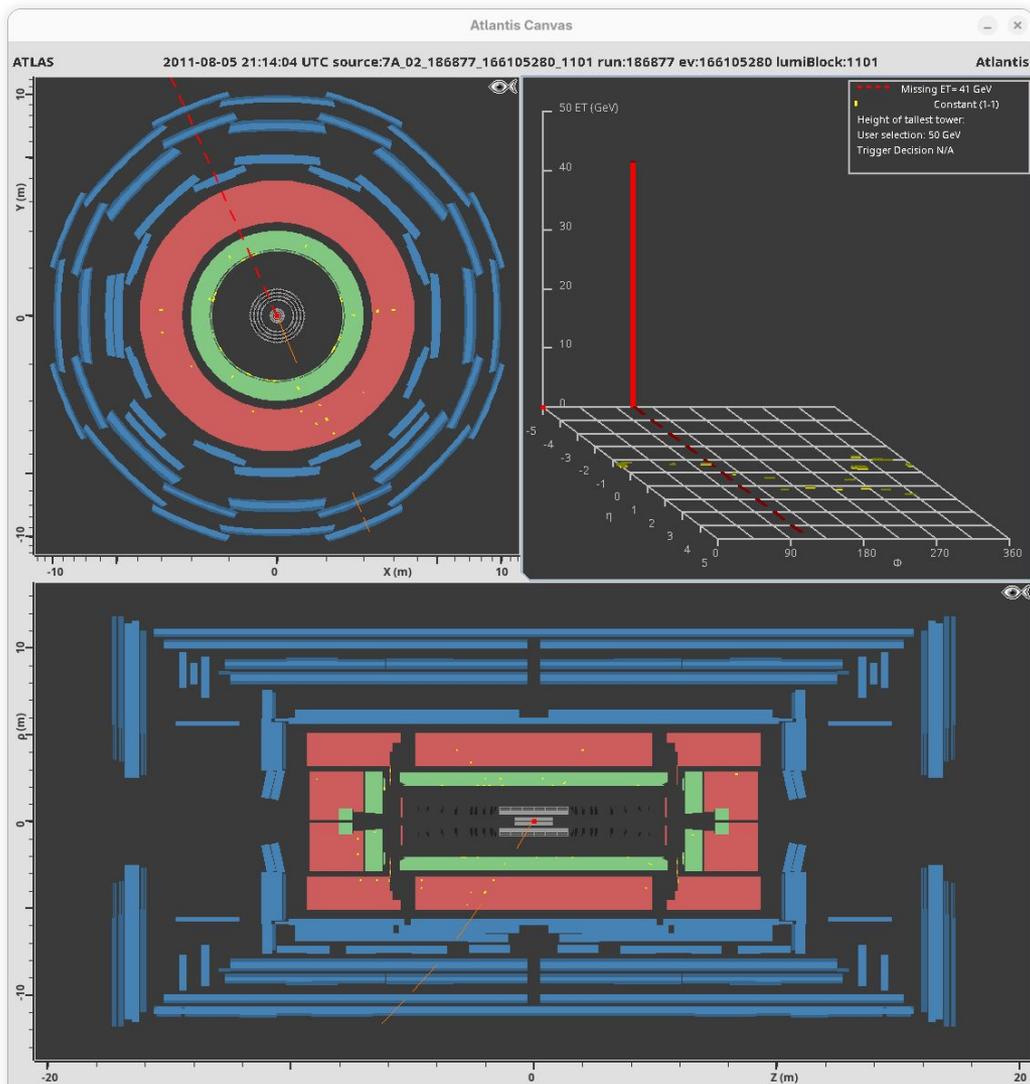
Przypadek #1

MET > 20 GeV



Przypadek #1

Liczba leptonów – elektronów i mionów?



Atlantis GUI

File Preferences Lists Reset Demo Previous Next Help

/home/kciesla/work/outreach/masterclasses/events_krakow/7A.zip/7A_02_186877_166105280_1101.xml

W 1 2 1 2
B 3 4

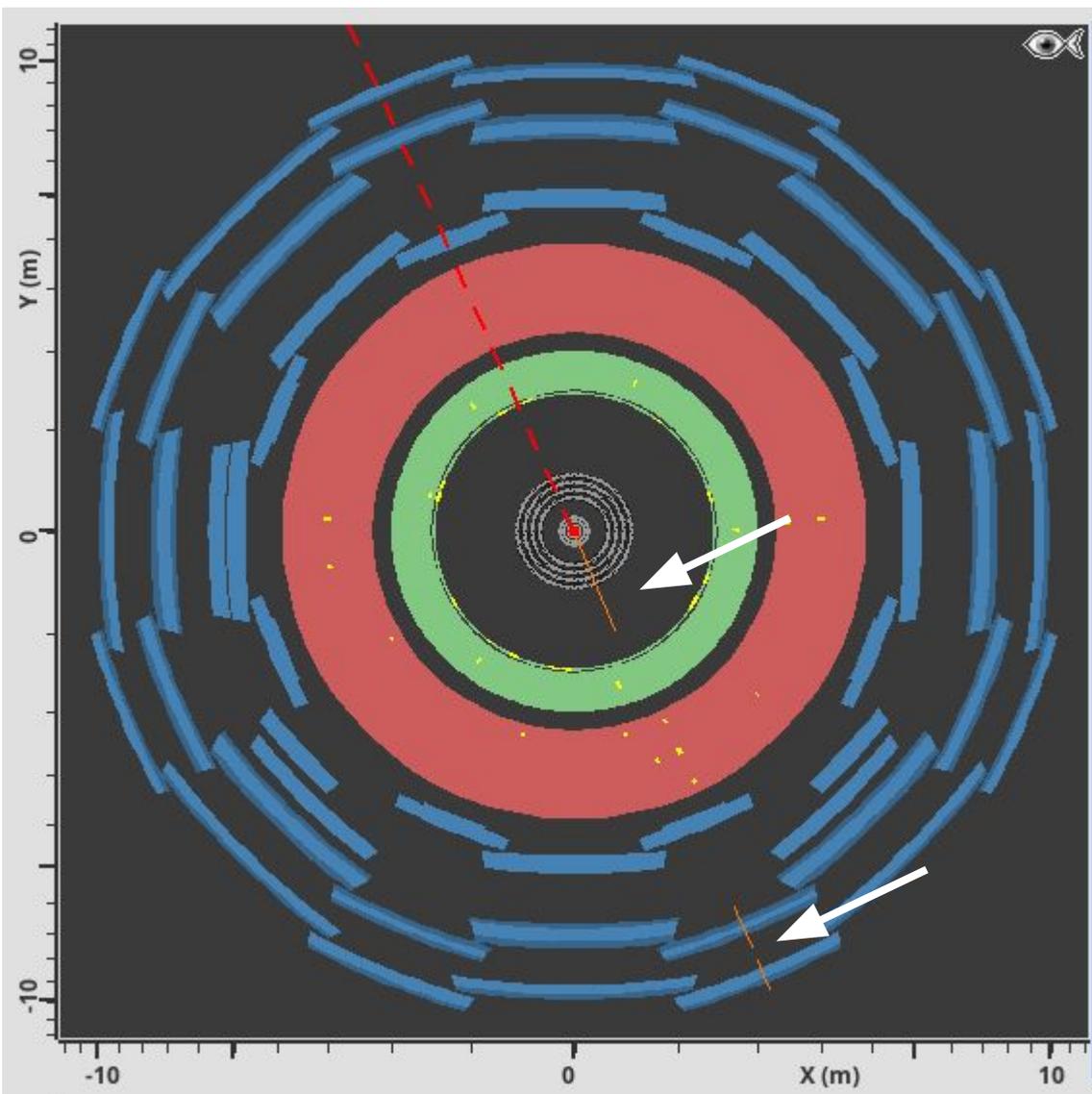
Cuts

InDet	Name	Value
<input checked="" type="checkbox"/>	Pt	> 10.0 GeV

The screenshot shows the Atlantis GUI interface. At the top, there is a menu bar with 'File', 'Preferences', and 'Lists'. Below the menu bar, there is a file path and navigation icons. A control panel contains buttons for 'W', 'B', and a 2x2 grid of buttons labeled '1 2' and '3 4'. The 'Cuts' section is expanded, showing a table with columns 'InDet', 'Name', and 'Value'. One cut is defined: 'Pt' with a value '> 10.0 GeV'.

Przypadek #1

Liczba leptonów – elektronów i mionów?



Atlantis GUI

References Lists

Reset Demo Previous Next Help

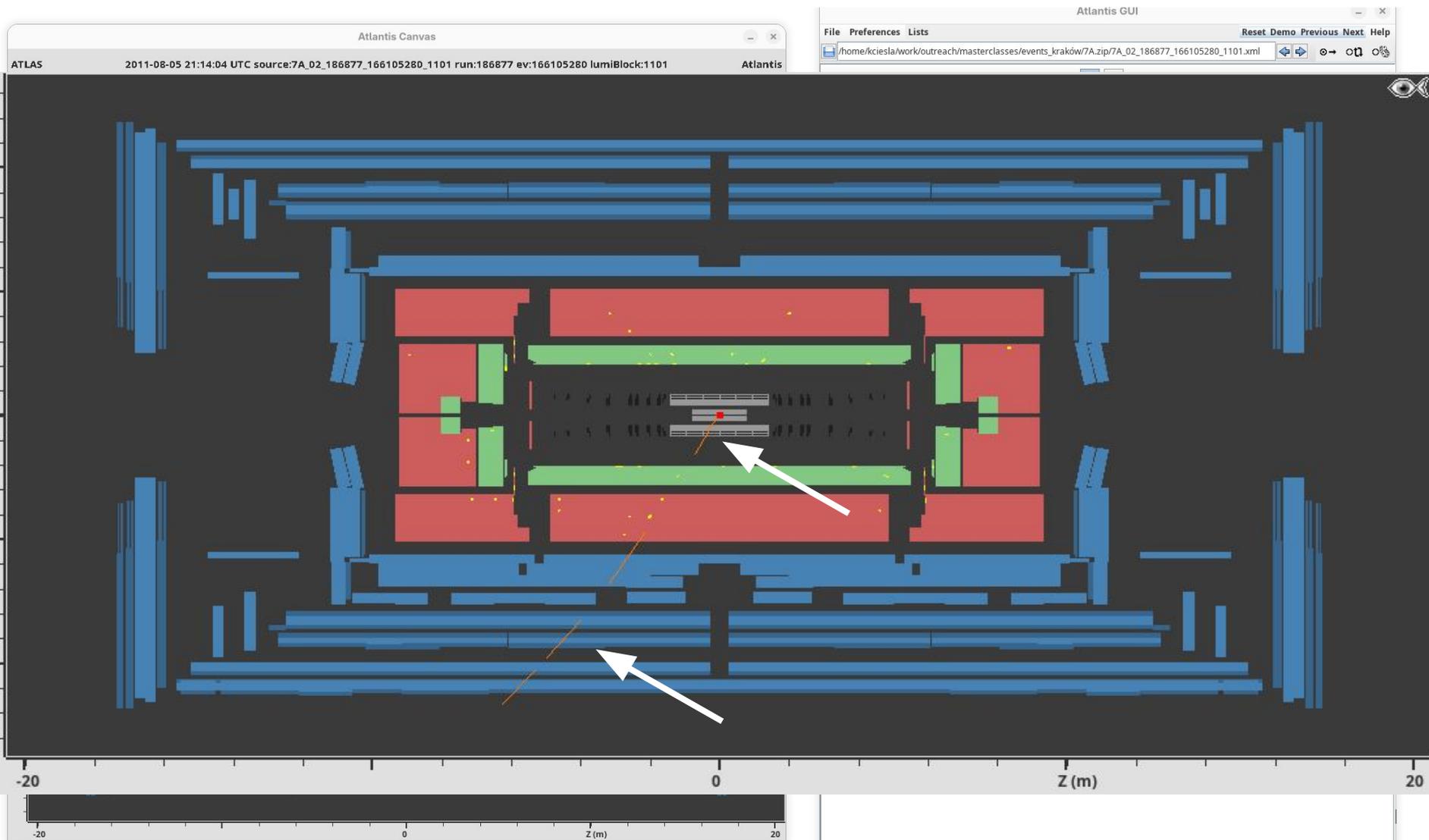
ne/kciesla/work/outreach/masterclasses/events_krakow/7A.zip/7A_02_186877_166105280_1101.xml

W 1 2 1 2
B 3 4 3 4

Name	Value
<input checked="" type="checkbox"/> Pt	> 10.0 GeV

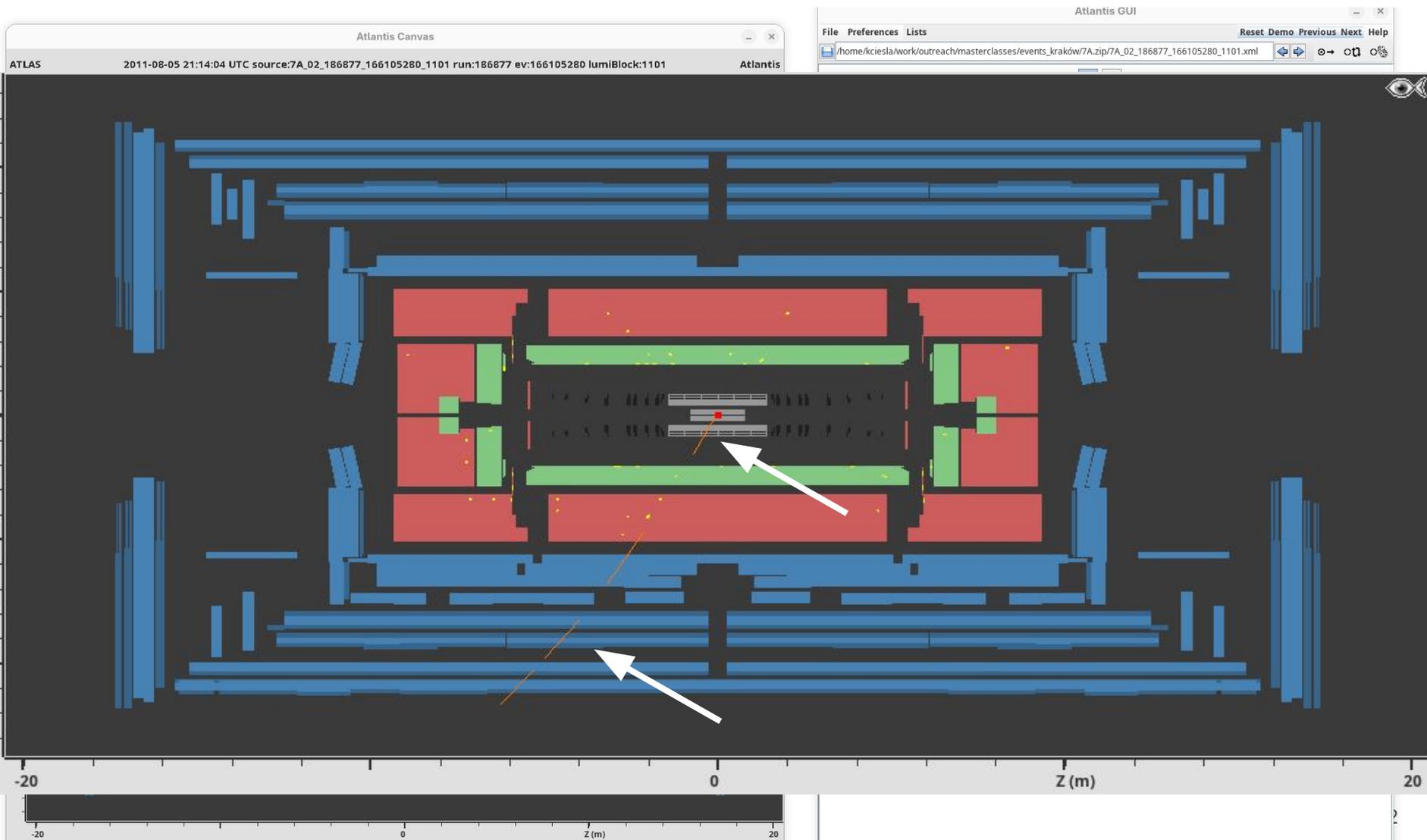
Przypadek #1

Liczba leptonów – elektronów i mionów?



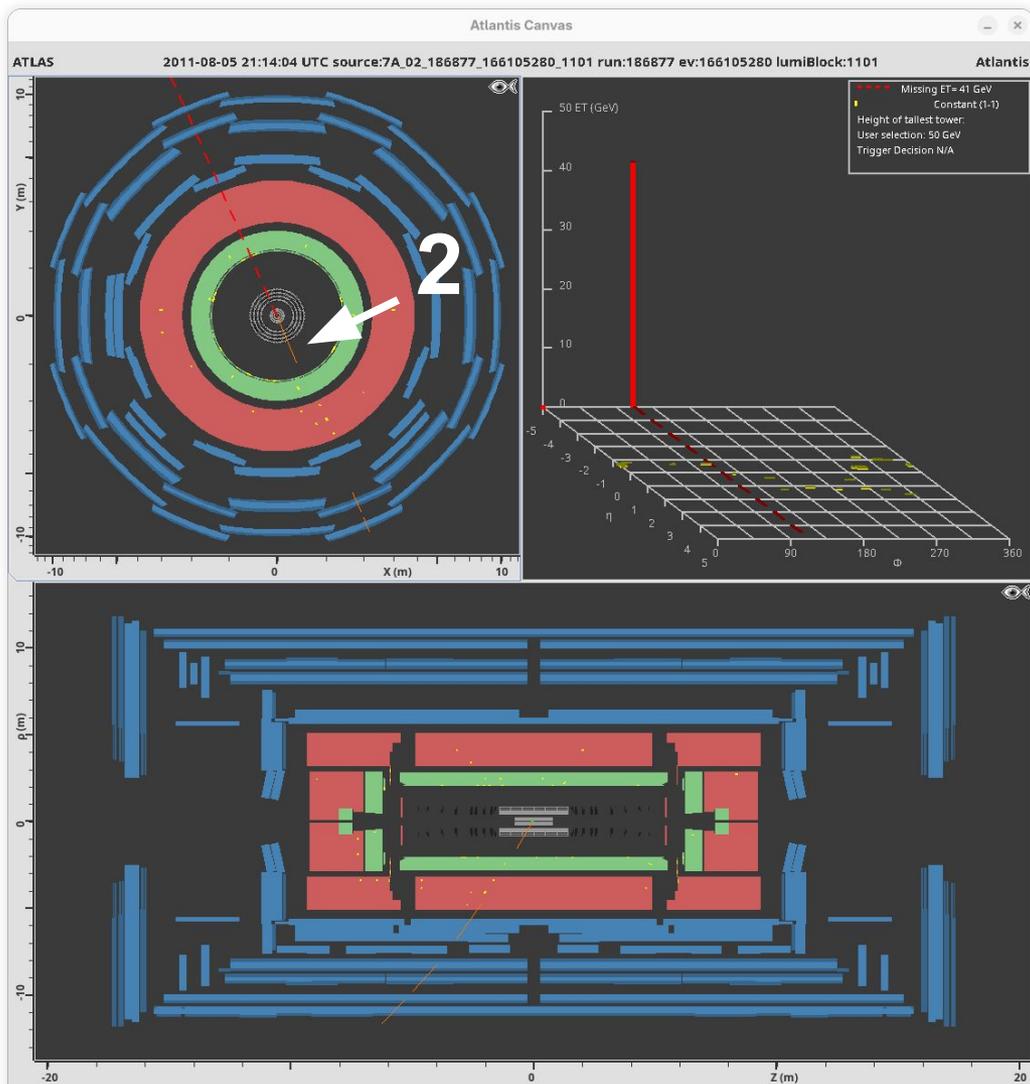
Przypadek #1

Kandydat na mion



Przypadek #1

pT muonu > 20 GeV?



Atlantis GUI

File Preferences Lists Reset Demo Previous Next Help

/home/kciesla/work/outreach/masterclasses/events_krakow/7A.zip/7A_02_186877_166105280_1101.xml

Event Data

W 1 2 1 2
B 3 4

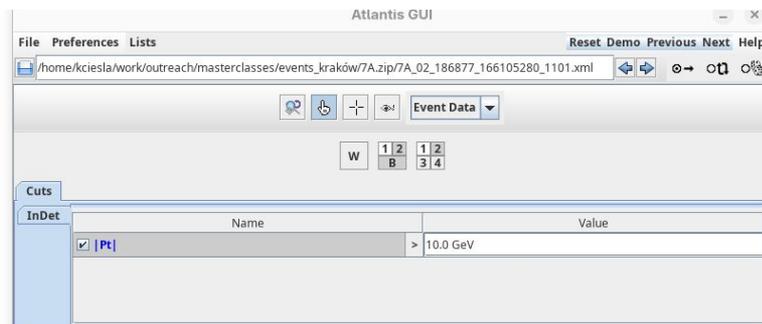
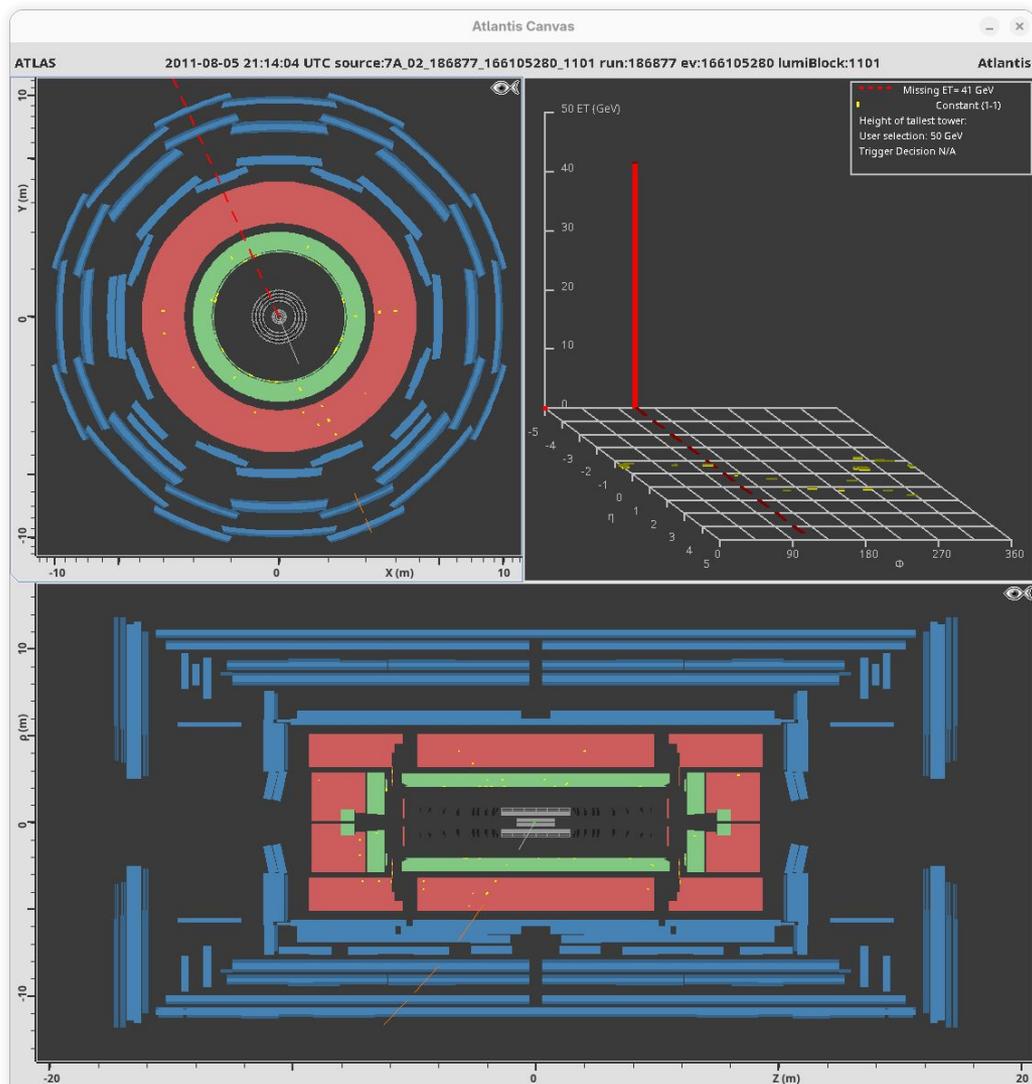
InDet	Name	Value
<input checked="" type="checkbox"/>	Pt	> 10.0 GeV

1

Atlantis GUI shows the event data and cuts configuration. A red arrow points to the 'Event Data' dropdown menu. Another red arrow points to the 'Pt' cut configuration in the 'Cuts' panel, which is set to '> 10.0 GeV'. The 'Cuts' panel is currently expanded to show the 'InDet' section.

Przypadek #1

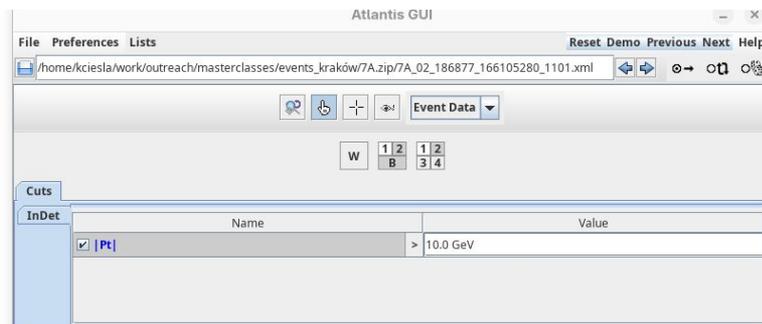
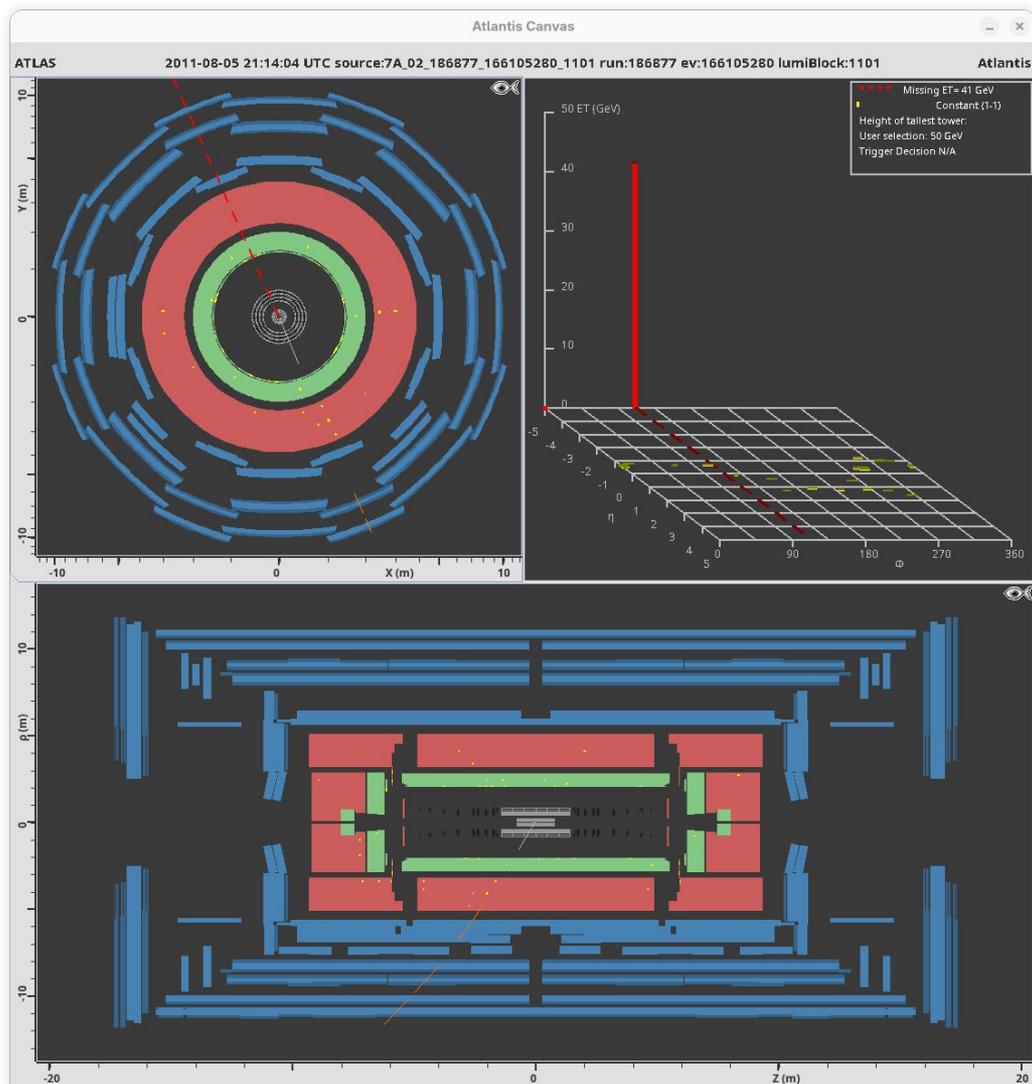
pT muonu > 20 GeV?



InDetTrack index: 2
PT = 35.838 GeV
 $\eta = -0.315$
 $\Phi = 291.733^\circ$
Px = 13.270 GeV
Py = -33.291 GeV
Pz = -11.470 GeV
Charge = -1
Isolation = 0.00

Przypadek #1

pT muonu > 20 GeV?



InDetTrack index: 2

PT = 35.838 GeV

$\eta = -0.315$

$\Phi = 291.733^\circ$

$P_x = 13.270 \text{ GeV}$

$P_y = -33.291 \text{ GeV}$

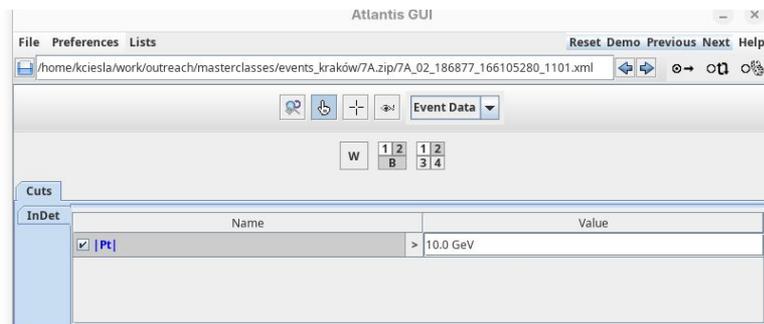
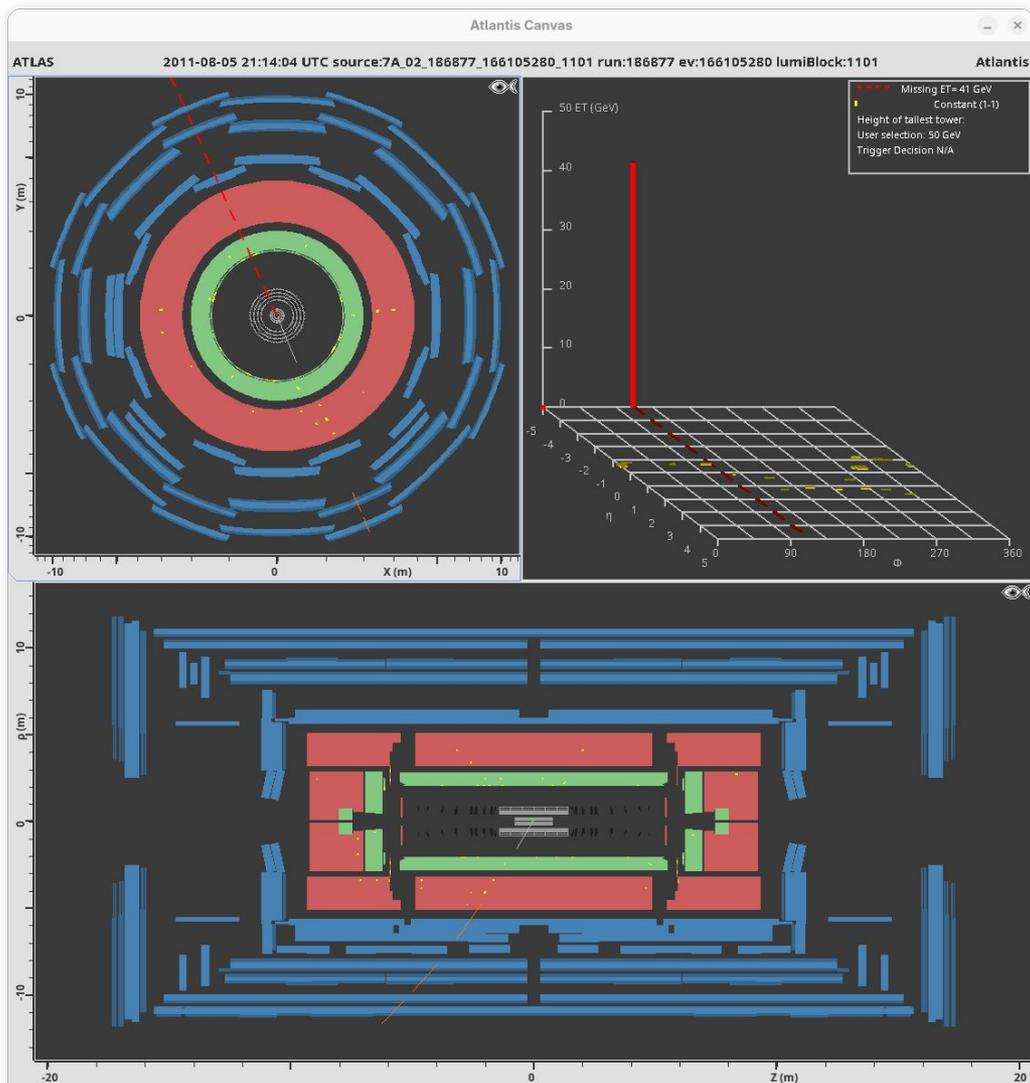
$P_z = -11.470 \text{ GeV}$

Charge = -1

Isolation = 0.00

Przypadek #1

pT muonu > 20 GeV



InDetTrack index: 2

PT = 35.838 GeV

$\eta = -0.315$

$\Phi = 291.733^\circ$

$P_x = 13.270 \text{ GeV}$

$P_y = -33.291 \text{ GeV}$

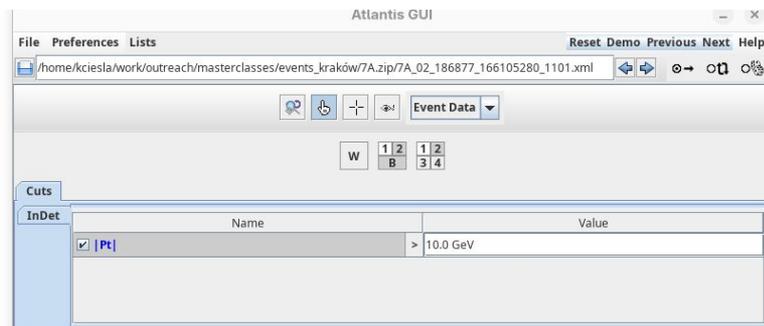
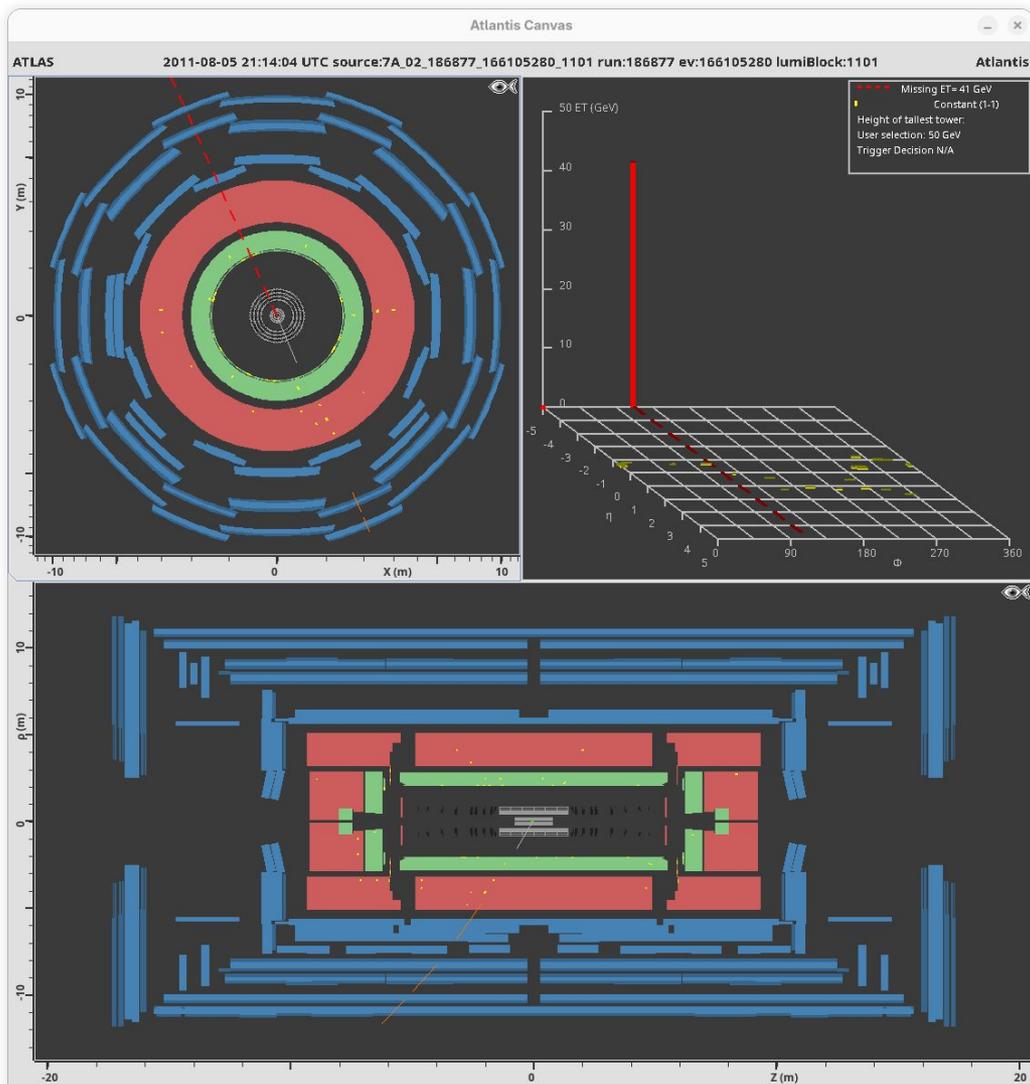
$P_z = -11.470 \text{ GeV}$

Charge = -1

Isolation = 0.00

Przypadek #1

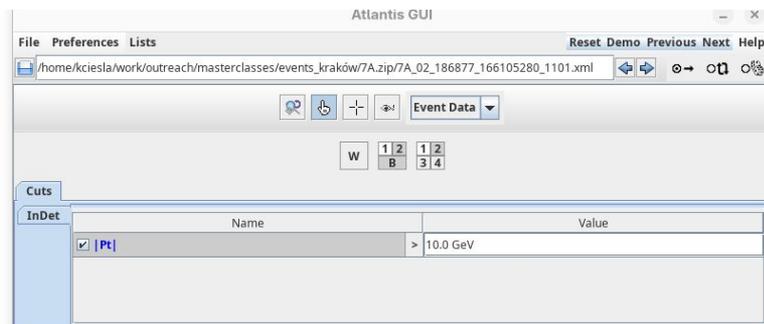
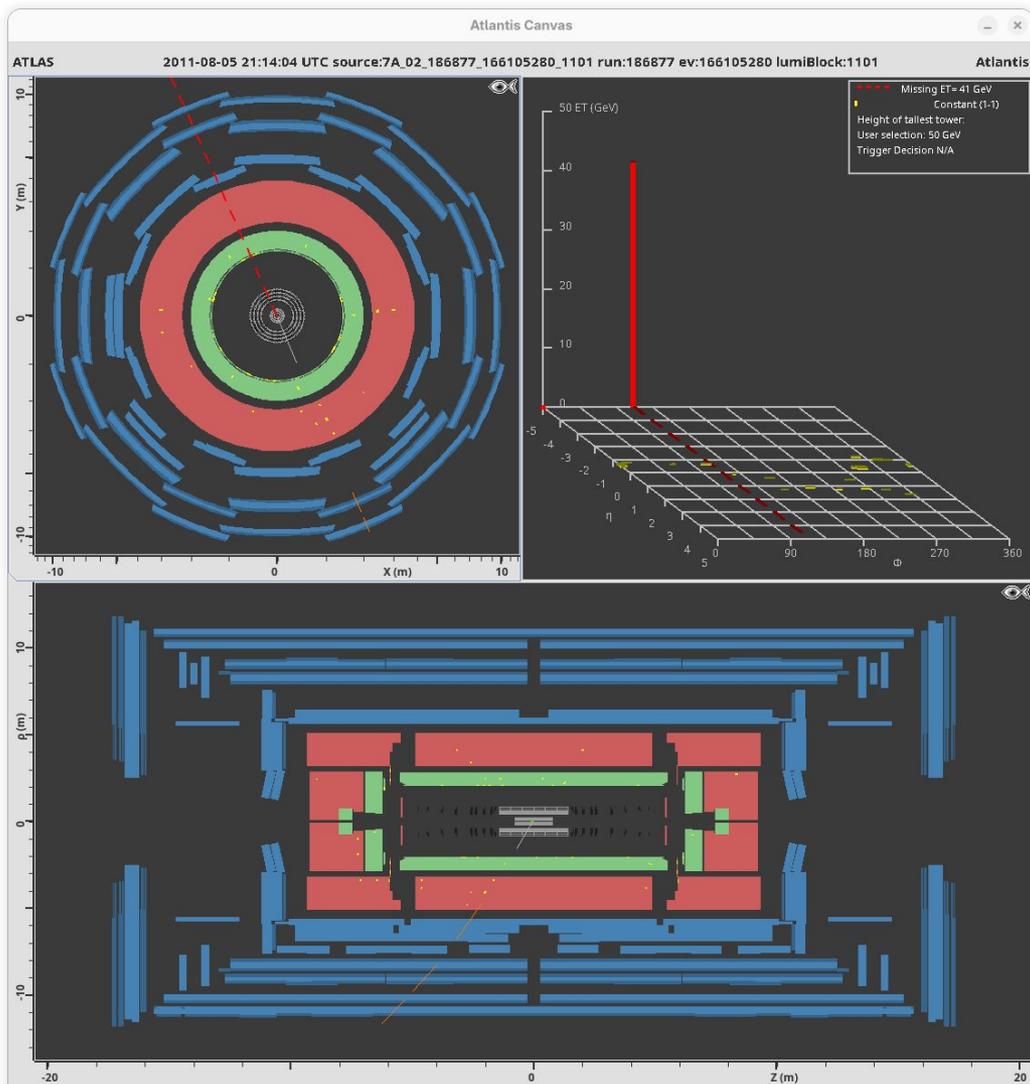
Brak pobliskich śladów?
Izolacja < 0.2?



InDetTrack index: 2
PT = 35.838 GeV
 $\eta = -0.315$
 $\Phi = 291.733^\circ$
Px = 13.270 GeV
Py = -33.291 GeV
Pz = -11.470 GeV
Charge = -1
Isolation = 0.00

Przypadek #1

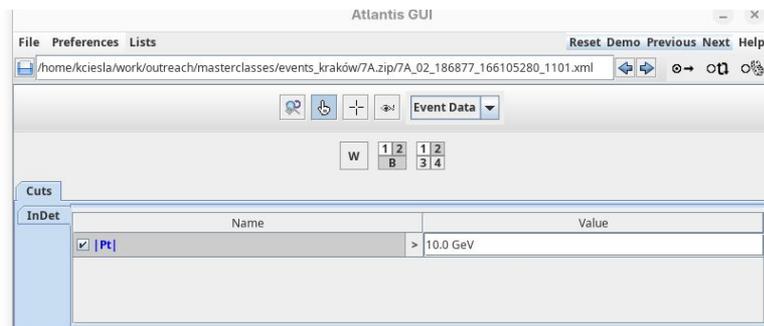
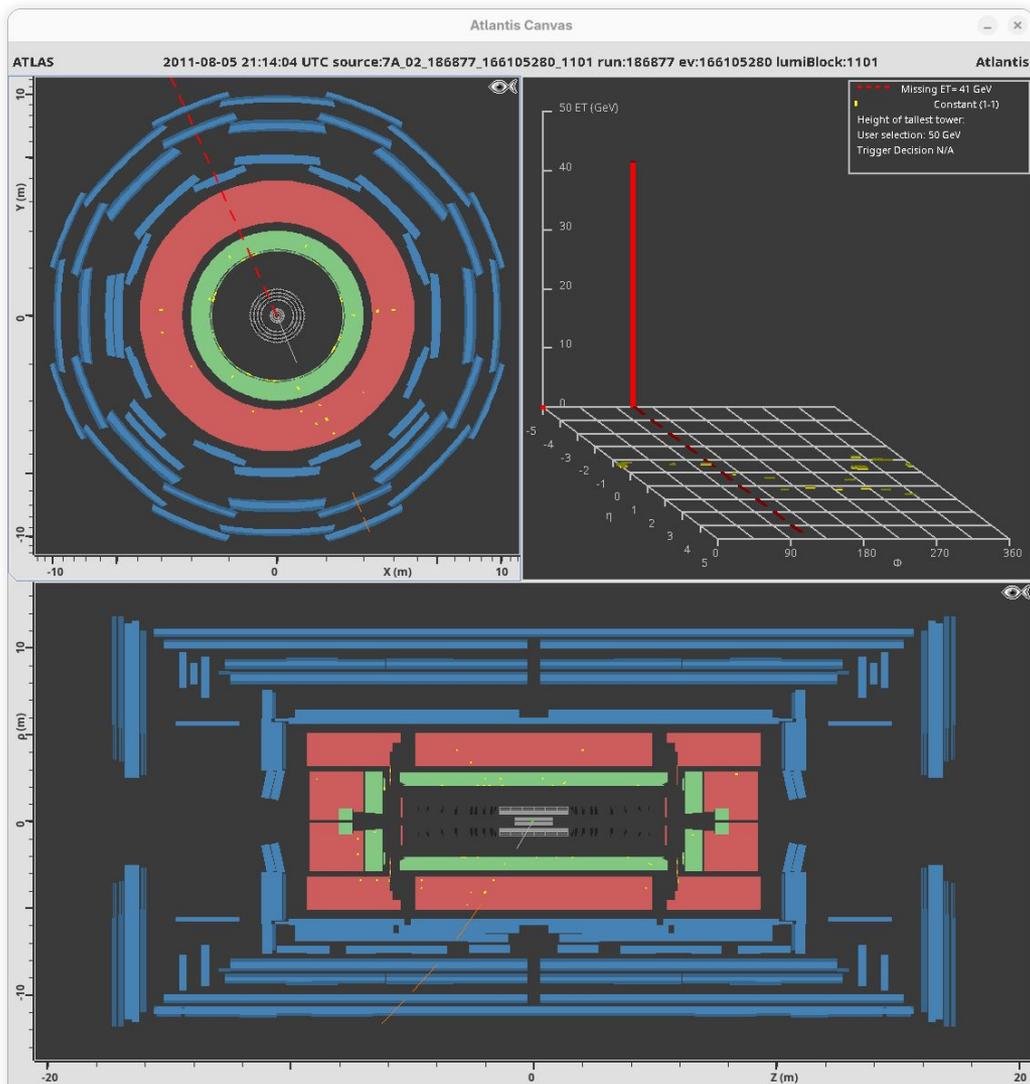
Brak pobliskich śladów
Izolacja < 0.2



InDetTrack index: 2
PT = 35.838 GeV
 $\eta = -0.315$
 $\Phi = 291.733^\circ$
Px = 13.270 GeV
Py = -33.291 GeV
Pz = -11.470 GeV
Charge = -1
Isolation = 0.00

Przypadek #1

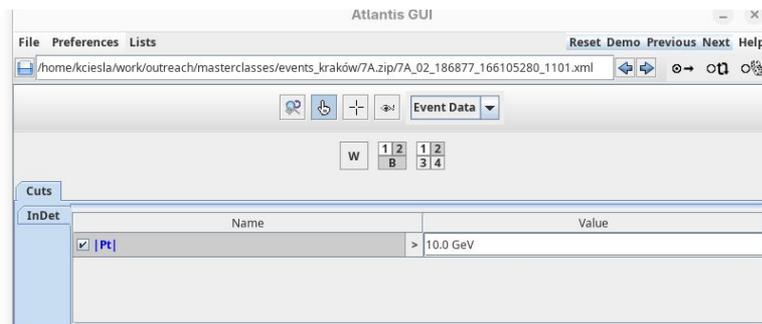
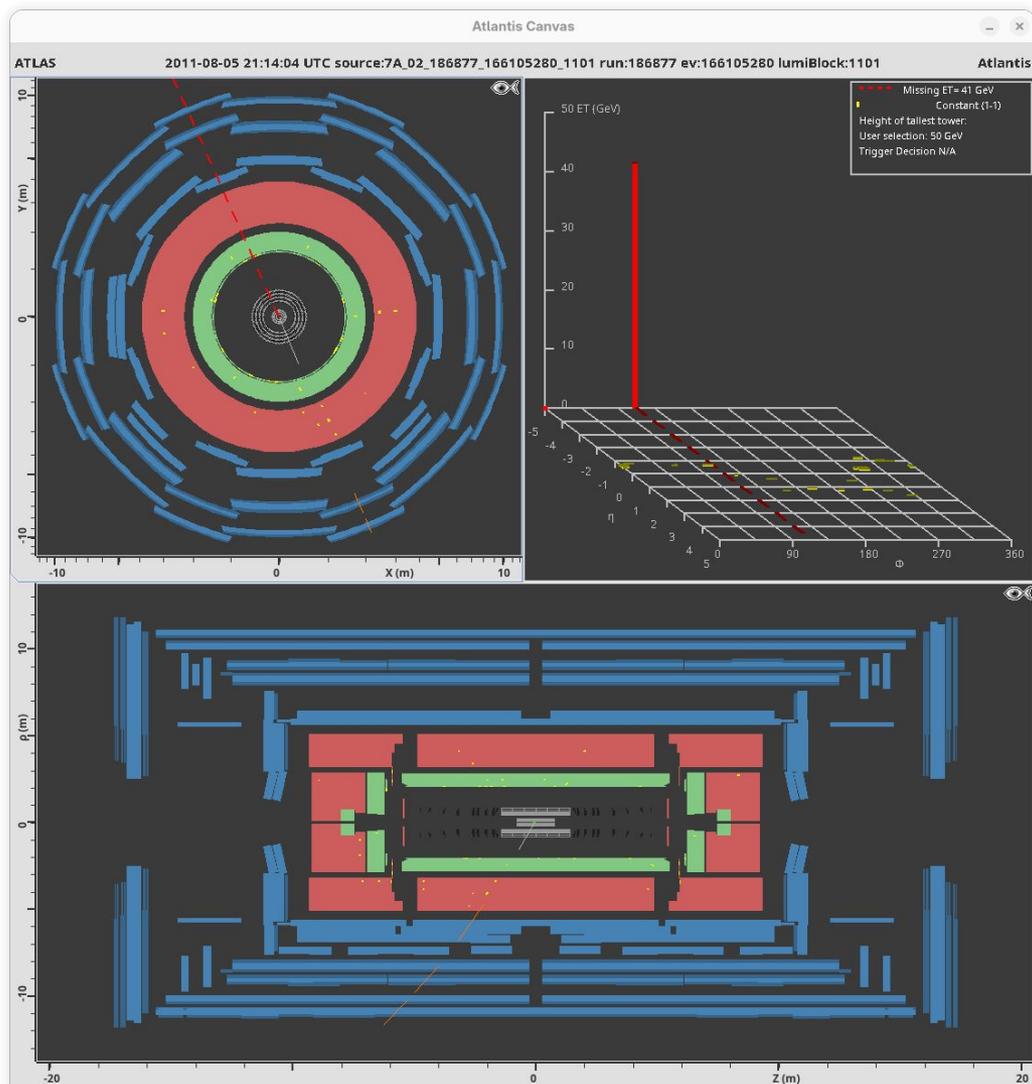
Mion czy anty-mion?



InDetTrack index: 2
PT = 35.838 GeV
 $\eta = -0.315$
 $\Phi = 291.733^\circ$
Px = 13.270 GeV
Py = -33.291 GeV
Pz = -11.470 GeV
Charge = -1
Isolation = 0.00

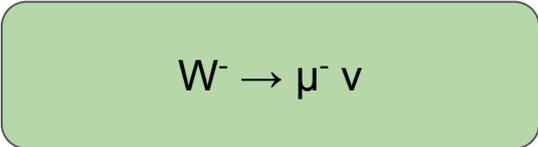
Przypadek #1

Mion



InDetTrack index: 2
PT = 35.838 GeV
 $\eta = -0.315$
 $\Phi = 291.733^\circ$
Px = 13.270 GeV
Py = -33.291 GeV
Pz = -11.470 GeV
Charge = -1
Isolation = 0.00

Przypadek #1



ATLAS data analysis

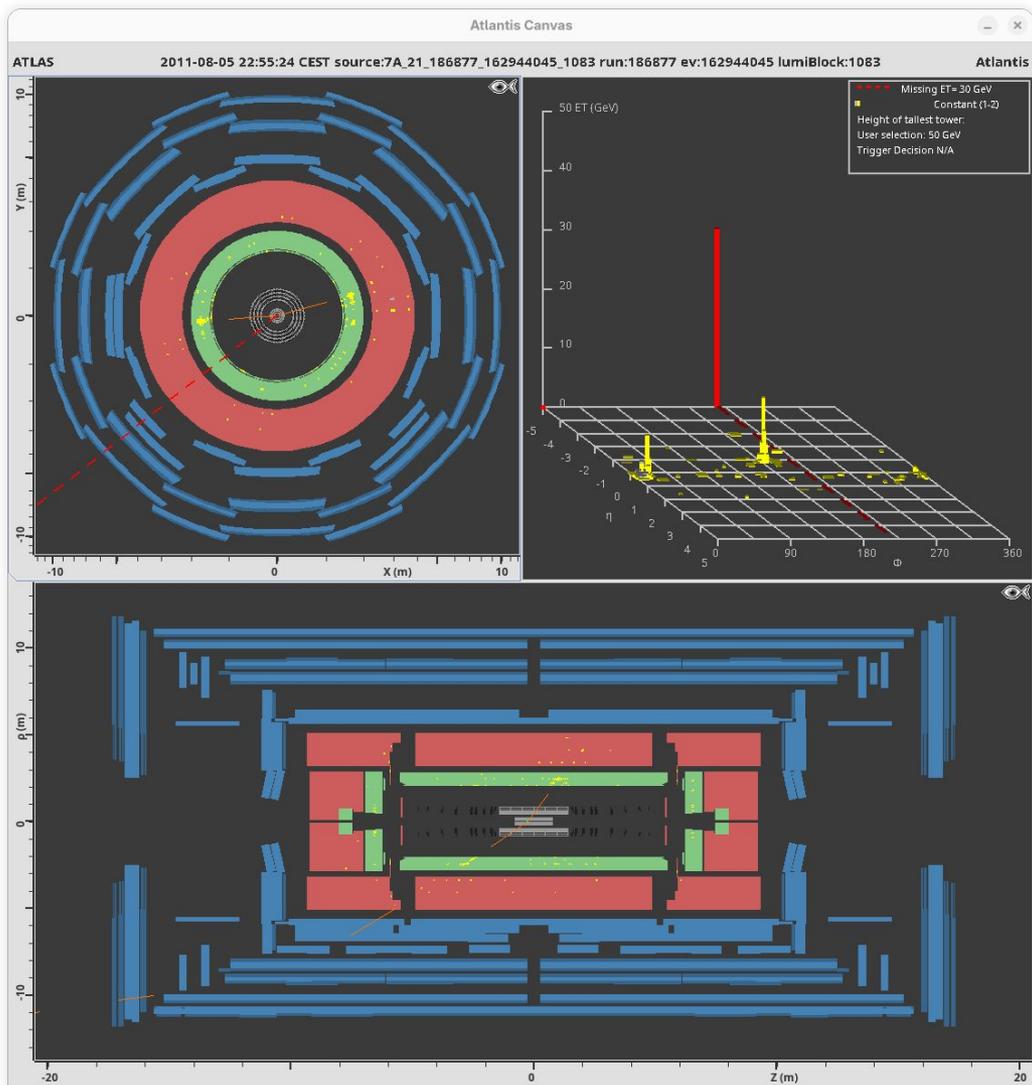
data sample: 5B

event number	signal with 1 lepton (I)				signal with 2 leptons (II)		Back-ground	Comment
	$W \rightarrow \nu + \dots$		$W \rightarrow \nu + \dots$		$WW \rightarrow l^+ \nu l^- \nu$	$\Delta\phi_{ll}$ round off to whole number		
	e^+	e^-	μ^+	μ^-				
1				X				
2								
3								
4								
5								
6								
7								
8								
9								
10								

Przykład #2

Przypadek #2

MET > 20 GeV?



Atlantis GUI

File Preferences Lists Reset Demo Previous Next Help

/home/kciesla/work/outreach/masterclasses/events_krakow/7A.zip/7A_21_186877_162944045_1083.xml

Event Data

W 1 2 1 2
B 3 4

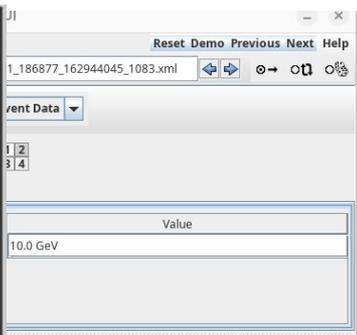
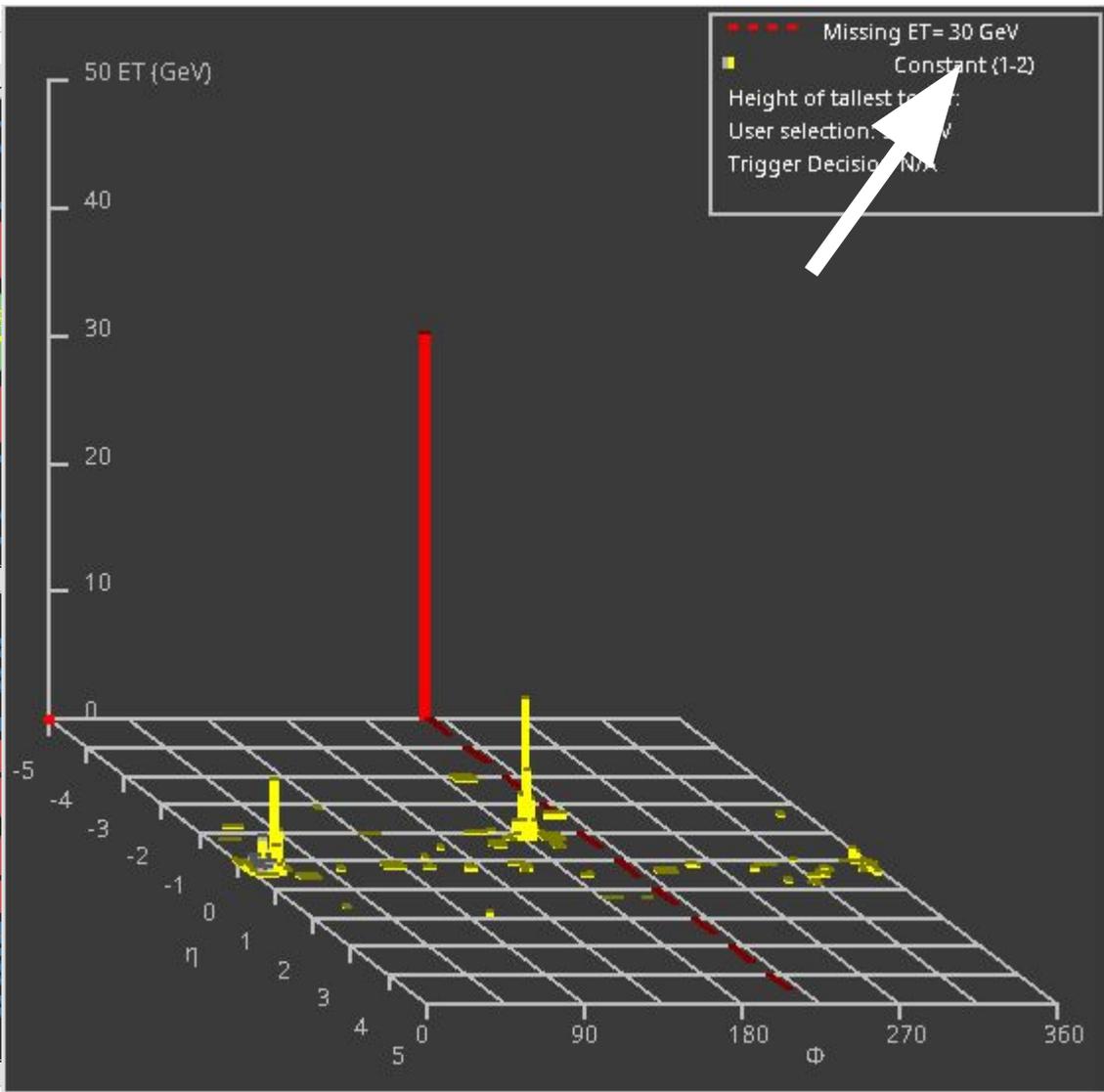
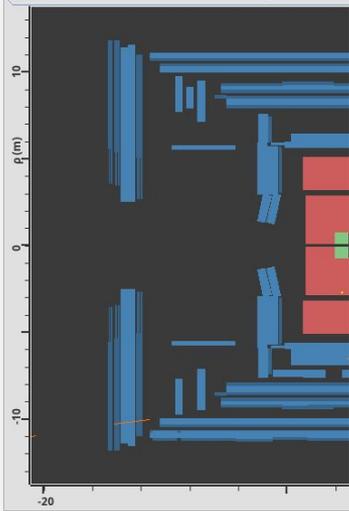
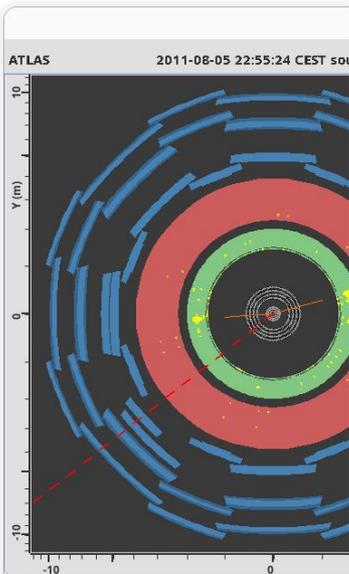
Cuts

InDet	Name	Value
<input checked="" type="checkbox"/>	Pt	> 10.0 GeV

The screenshot shows the Atlantis GUI interface. It includes a menu bar (File, Preferences, Lists, Reset Demo, Previous, Next, Help) and a file path. Below the file path are navigation icons and a dropdown menu for 'Event Data'. A table shows detector region selections: W (1, 2) and B (3, 4). A 'Cuts' panel is visible, containing a table with one entry: 'Pt' with a value '> 10.0 GeV'.

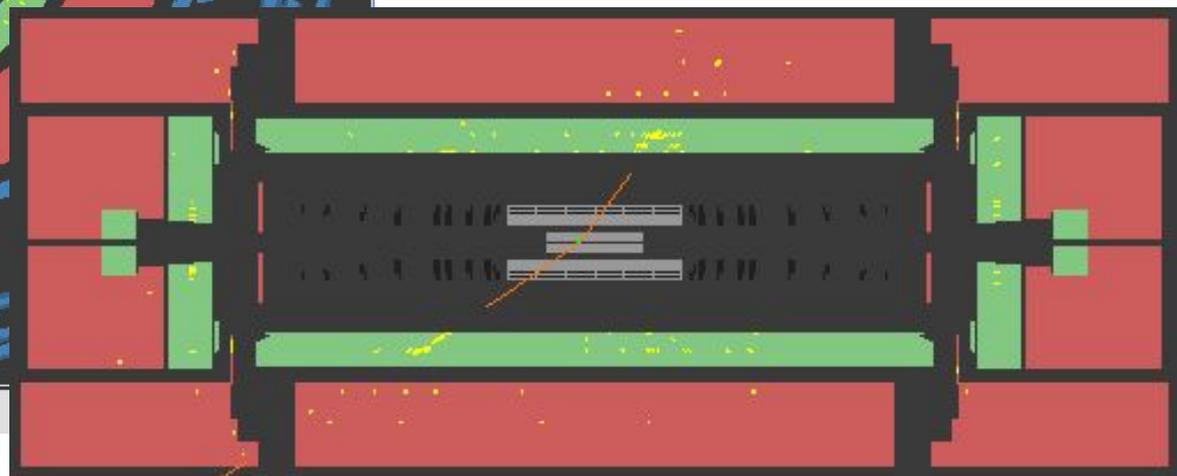
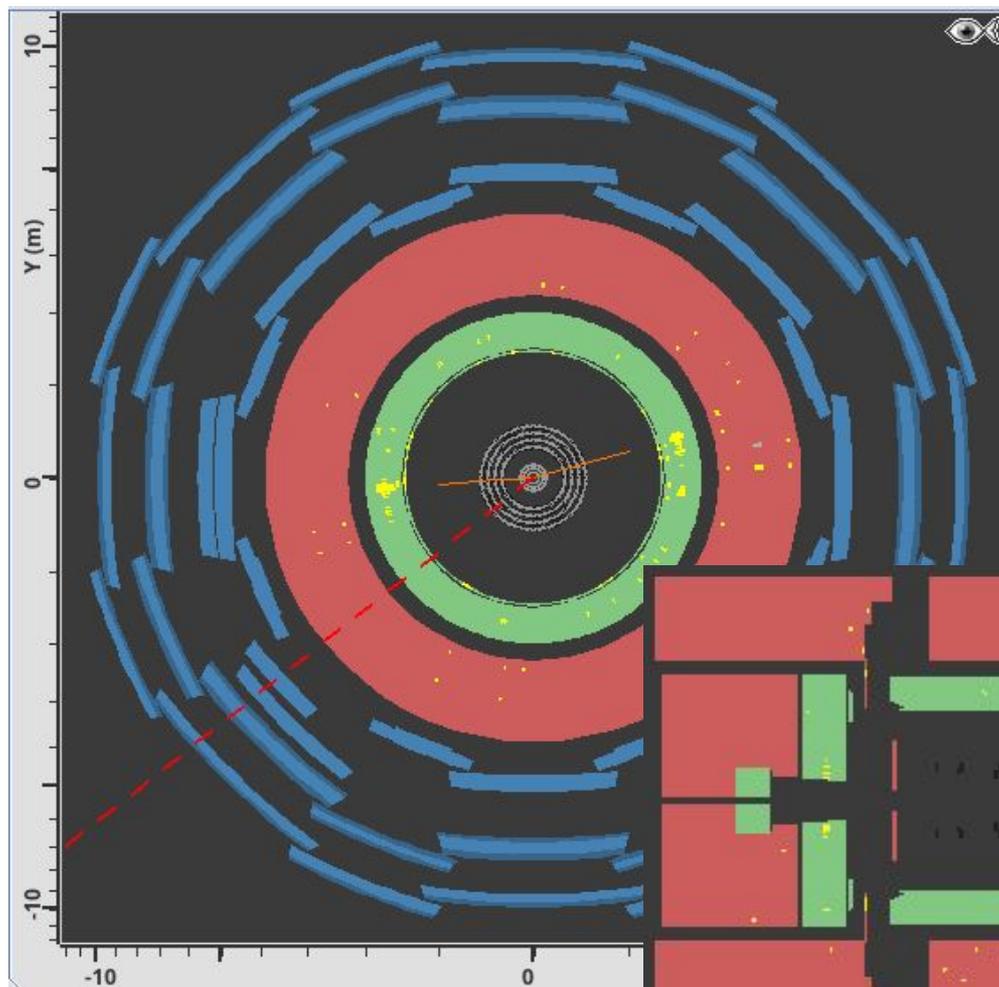
Przypadek #2

MET > 20 GeV



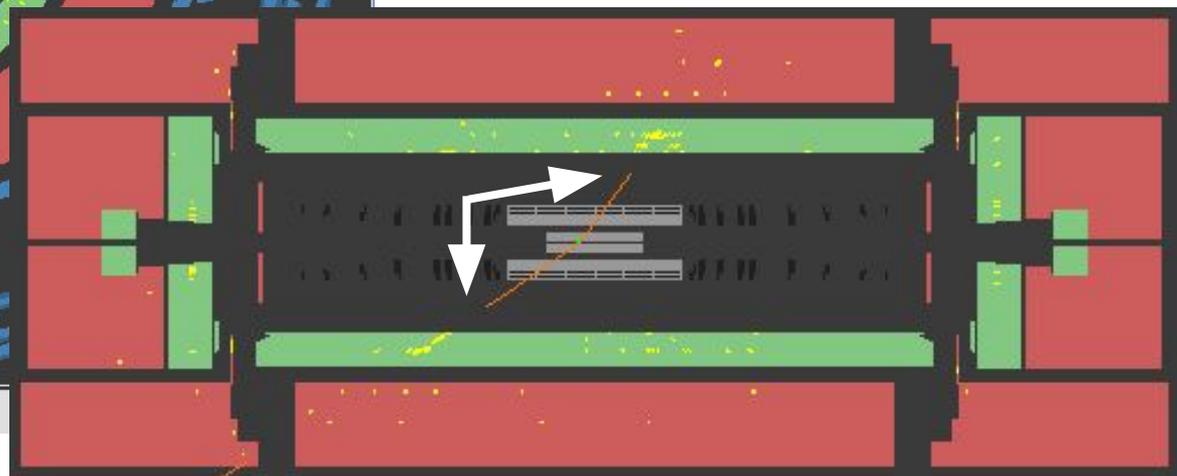
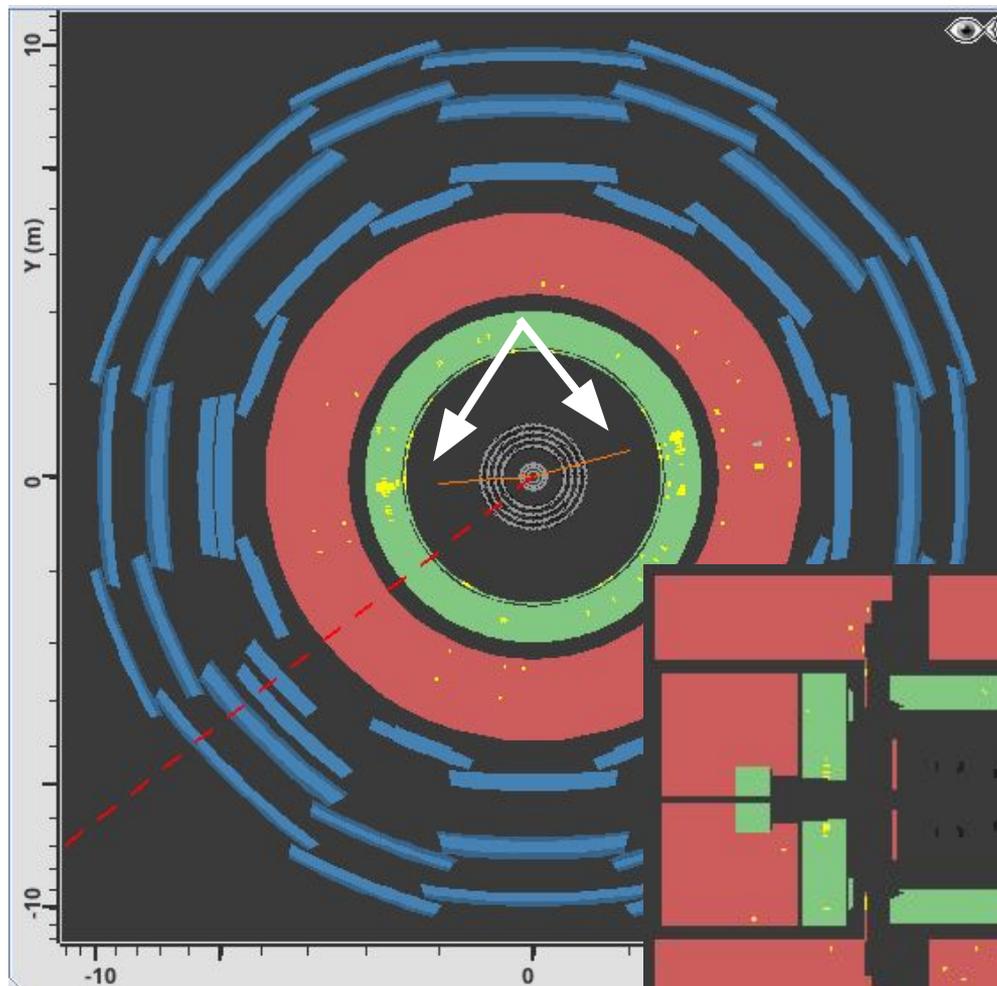
Przypadek #2

Liczba leptonów – elektronów i mionów?



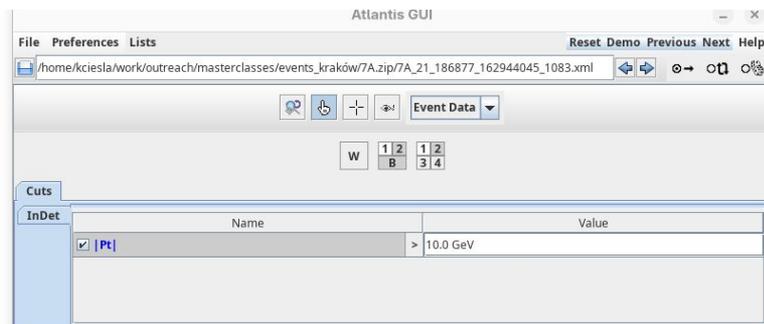
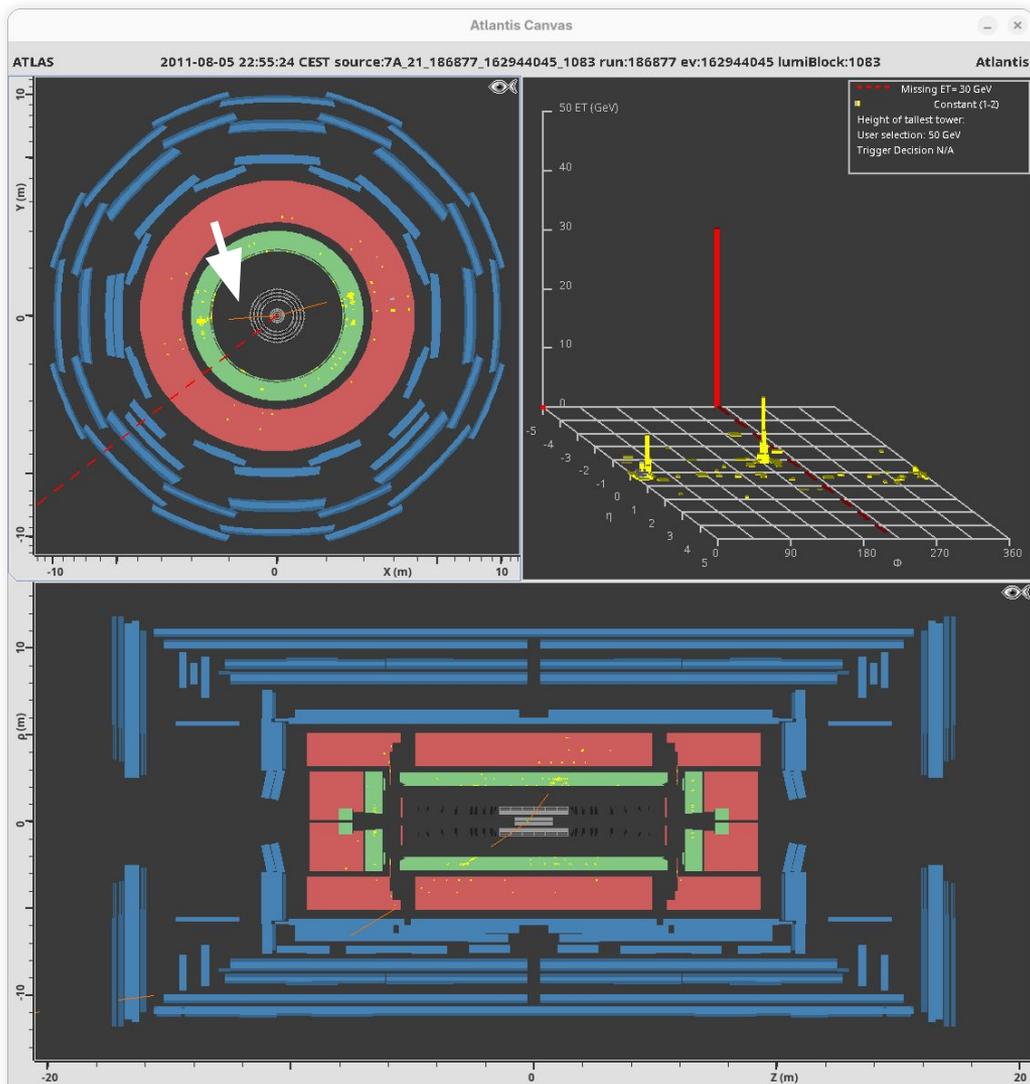
Przypadek #2

Dwóch kandydatów na elektrony



Przypadek #2

$p_T \text{ leptonu}^{(1)} > 20 \text{ GeV?}$
 $p_T \text{ leptonu}^{(2)} > 10 \text{ GeV?}$



InDetTrack index: 95

PT = 16.989 GeV

$\eta = -0.756$

$\Phi = 183.483^\circ$

$P_x = -16.957 \text{ GeV}$

$P_y = -1.032 \text{ GeV}$

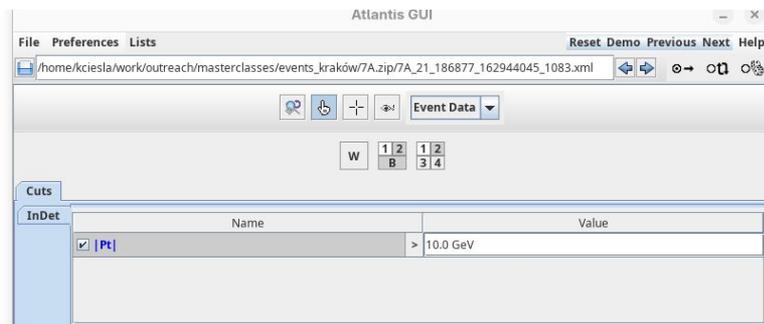
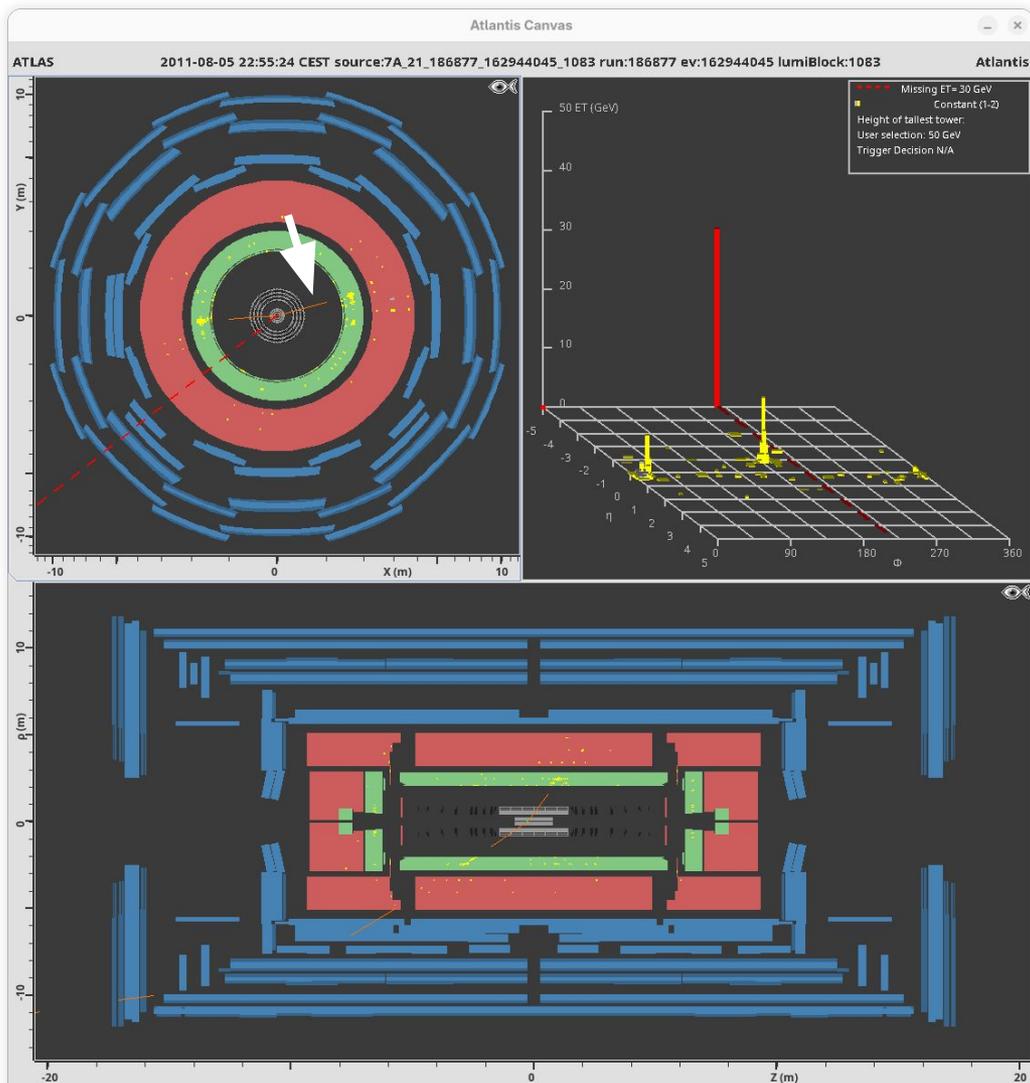
$P_z = -14.102 \text{ GeV}$

Charge = -1

Isolation = 0.94

Przypadek #2

$p_T \text{ leptonu}^{(1)} > 20 \text{ GeV?}$
 $p_T \text{ leptonu}^{(2)} > 10 \text{ GeV?}$



InDetTrack index: 3

PT = 19.427 GeV

$\eta = 0.383$

$\Phi = 14.703^\circ$

$P_x = 18.791 \text{ GeV}$

$P_y = 4.931 \text{ GeV}$

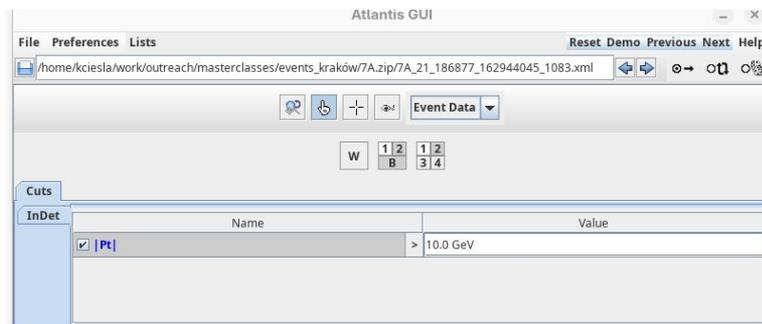
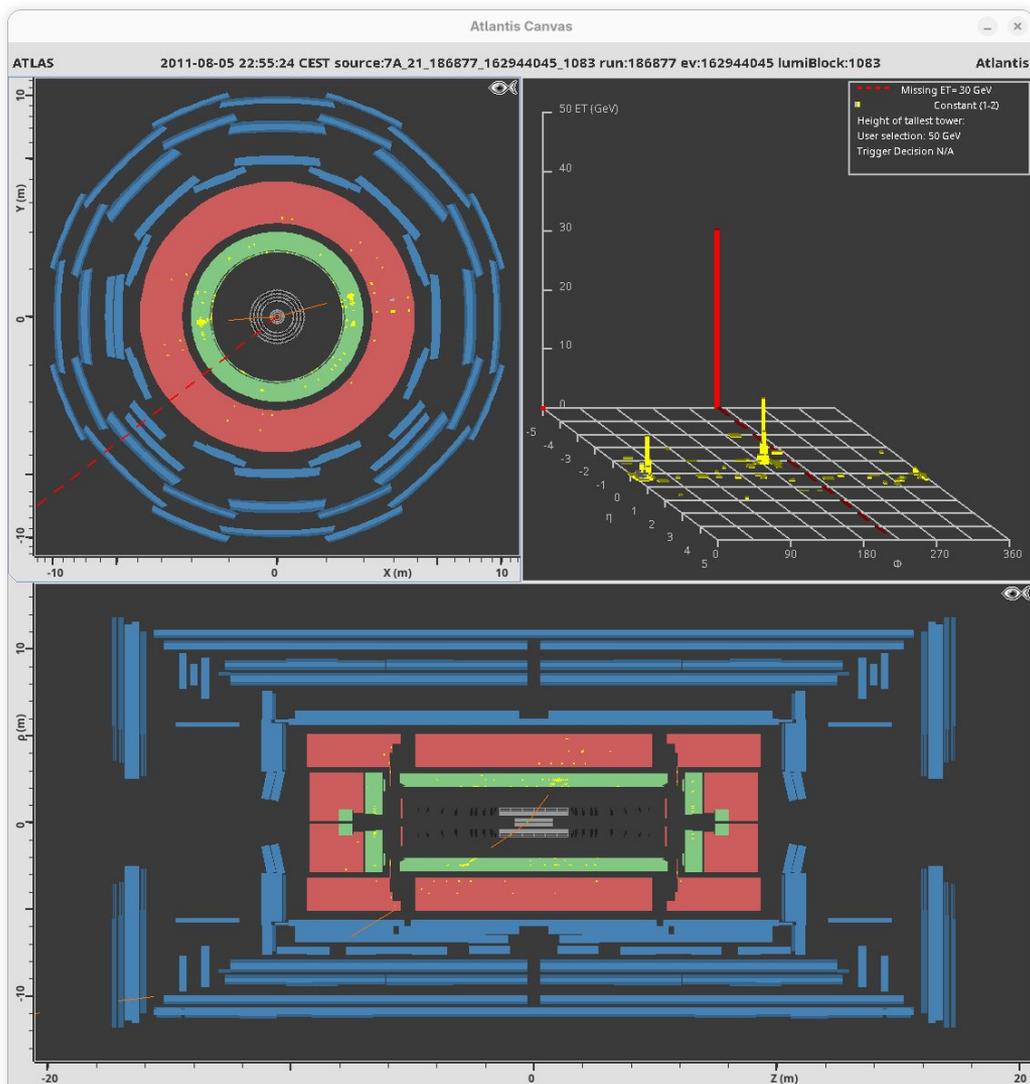
$P_z = 7.633 \text{ GeV}$

Charge = -1

Isolation = 1.35

Przypadek #2

$p_T \text{ leptonu}^{(1)} > 20 \text{ GeV}$
 $p_T \text{ leptonu}^{(2)} > 10 \text{ GeV}$



InDetTrack index: 3

PT = 19.427 GeV

$\eta = 0.383$

$\Phi = 14.703^\circ$

$P_x = 18.791 \text{ GeV}$

$P_y = 4.931 \text{ GeV}$

$P_z = 7.633 \text{ GeV}$

Charge = -1

Isolation = 1.35

Przypadek #2

Tło

ATLAS data analysis

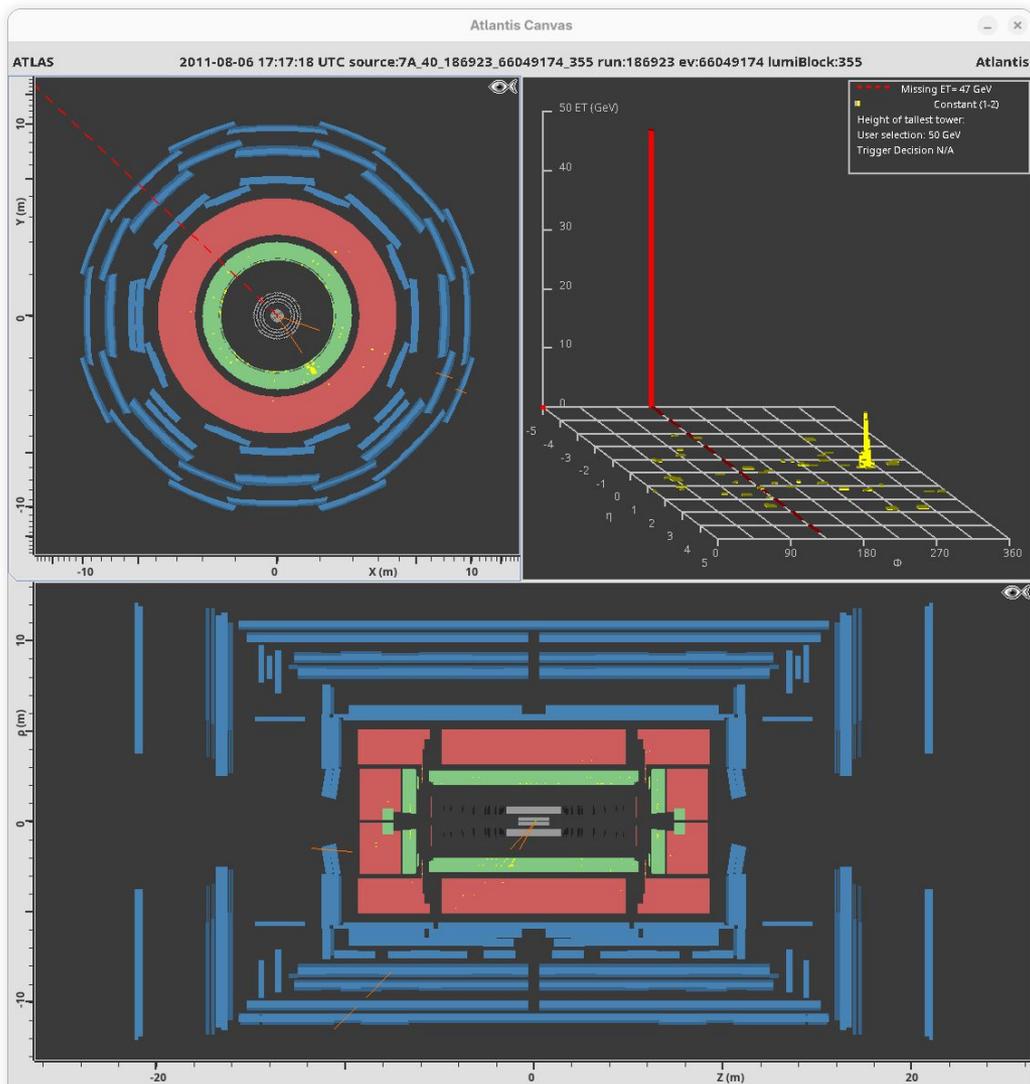
data sample: 5B

event number	signal with 1 lepton (I)				signal with 2 leptons (II)		Back-ground	Comment
	$W \rightarrow \nu + \dots$		$W \rightarrow \nu + \dots$		$WW \rightarrow l^+ \nu l^- \nu$	$\Delta\phi_{ll}$ round off to whole number		
	e^+	e^-	μ^+	μ^-				
1				X				
2							X	
3								
4								
5								
6								
7								
8								
9								
10								

Przykład #3

Przypadek #3

MET > 20 GeV?



Atlantis GUI

File Preferences Lists Reset Demo Previous Next Help

/home/kciesla/work/outreach/masterclasses/events_krakow/7A.zip/7A_40_186923_66049174_355.xml

Event Data

W 1 2 1 2
B 3 4

Cuts

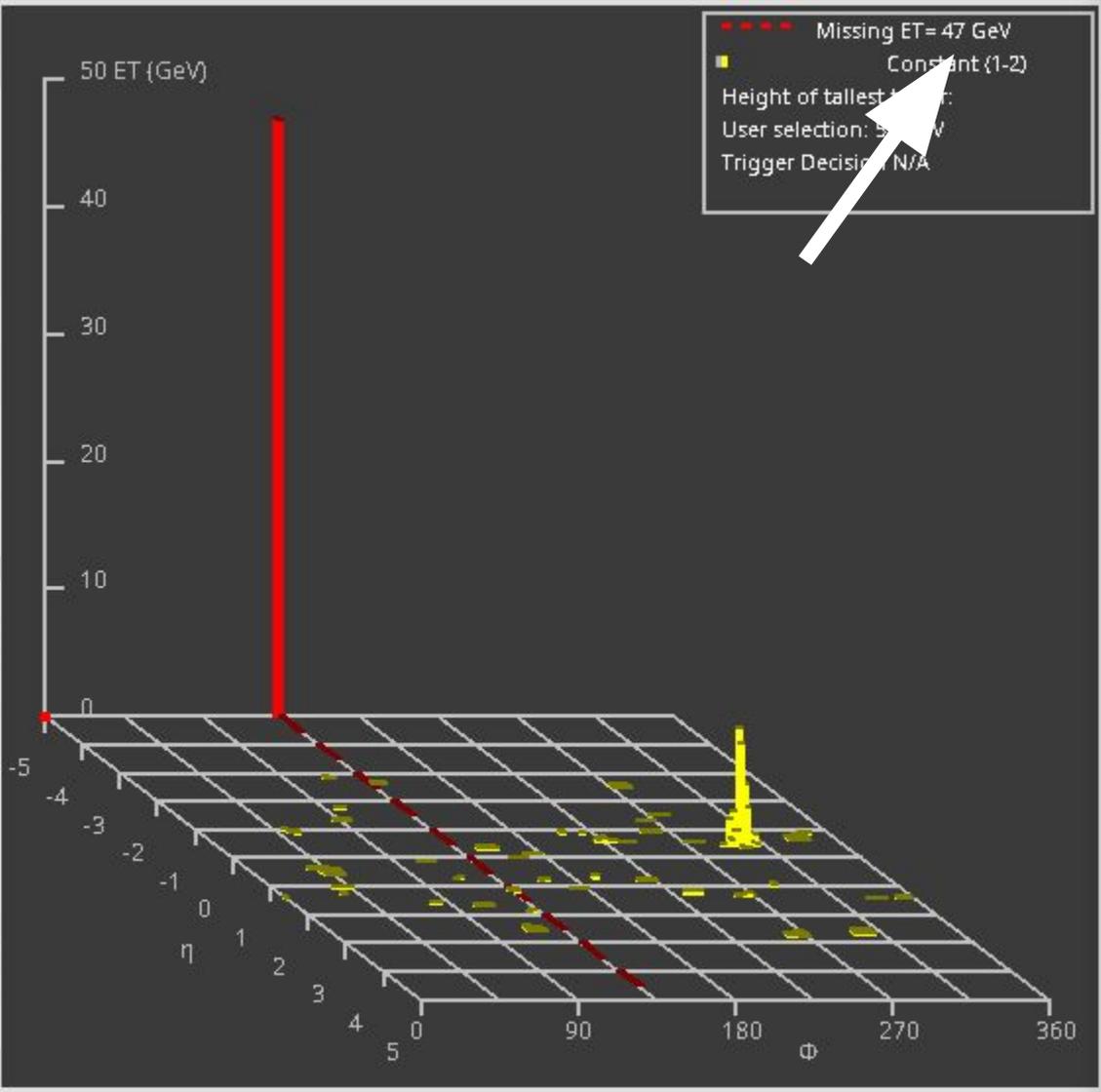
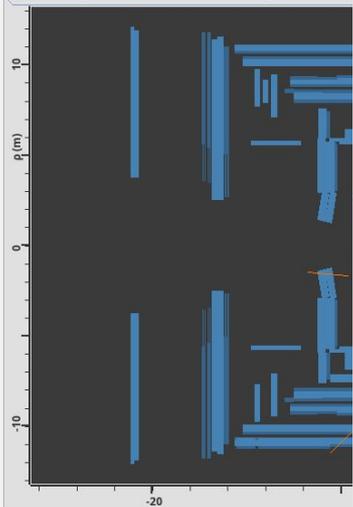
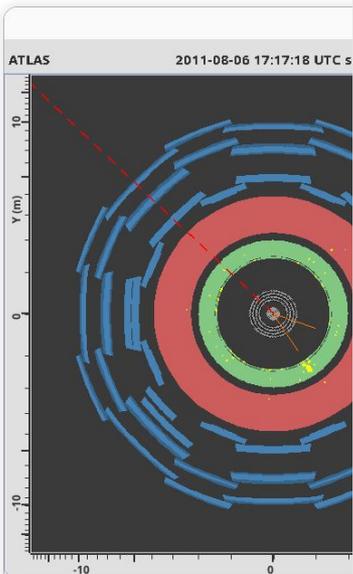
InDet

Name	Value
<input checked="" type="checkbox"/> Pt	> 10.0 GeV

Atlantis GUI shows the event data and cuts configuration. The event data is displayed as a table with columns for Name and Value. The cuts configuration is shown in a table with a checkbox and a value. The event data table is empty, and the cuts configuration table has one entry: Pt > 10.0 GeV.

Przypadek #3

MET > 20 GeV



Reset Demo Previous Next Help

0_186923_66049174_355.xml

Event Data

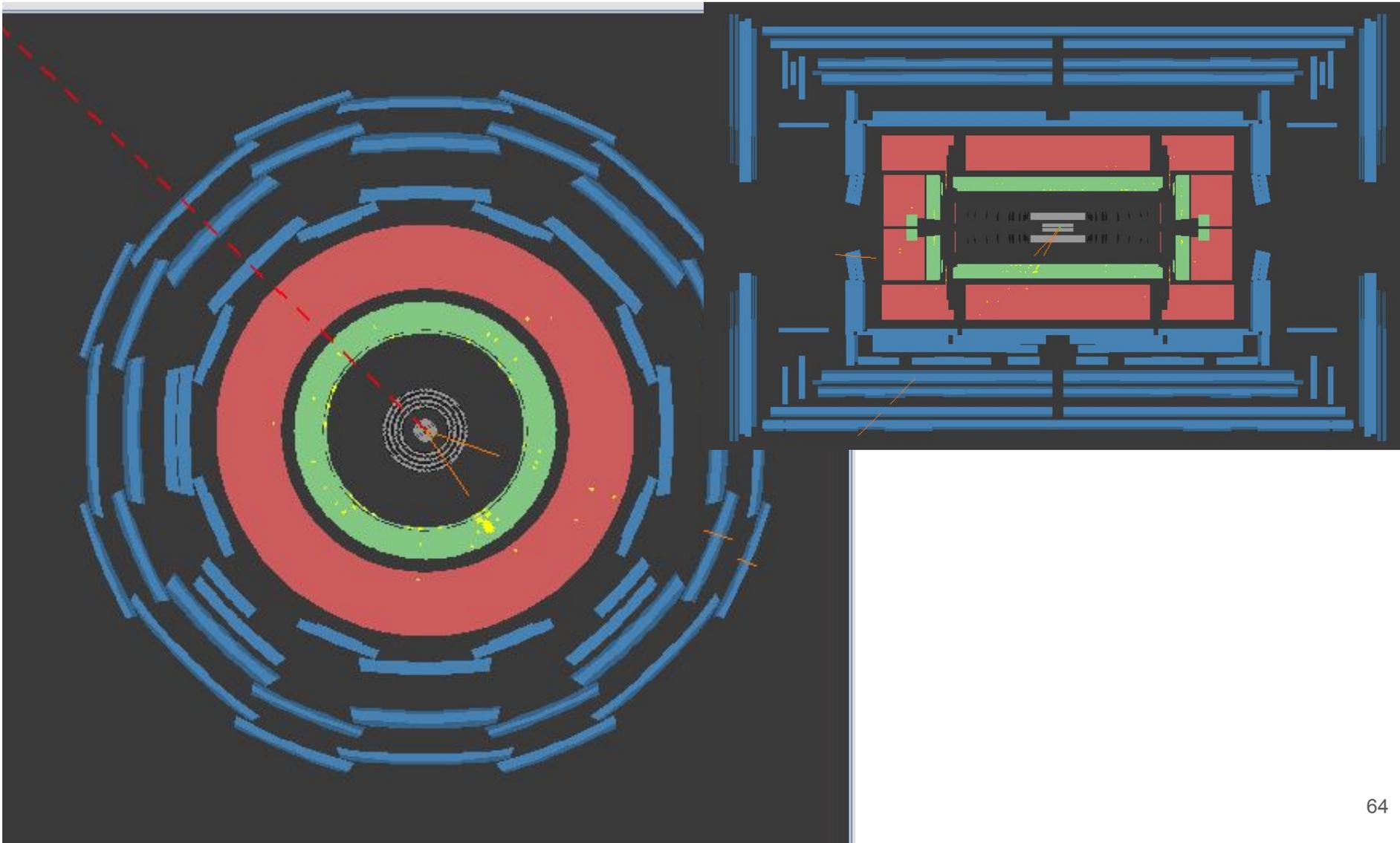
1 2
3 4

Value

10.0 GeV

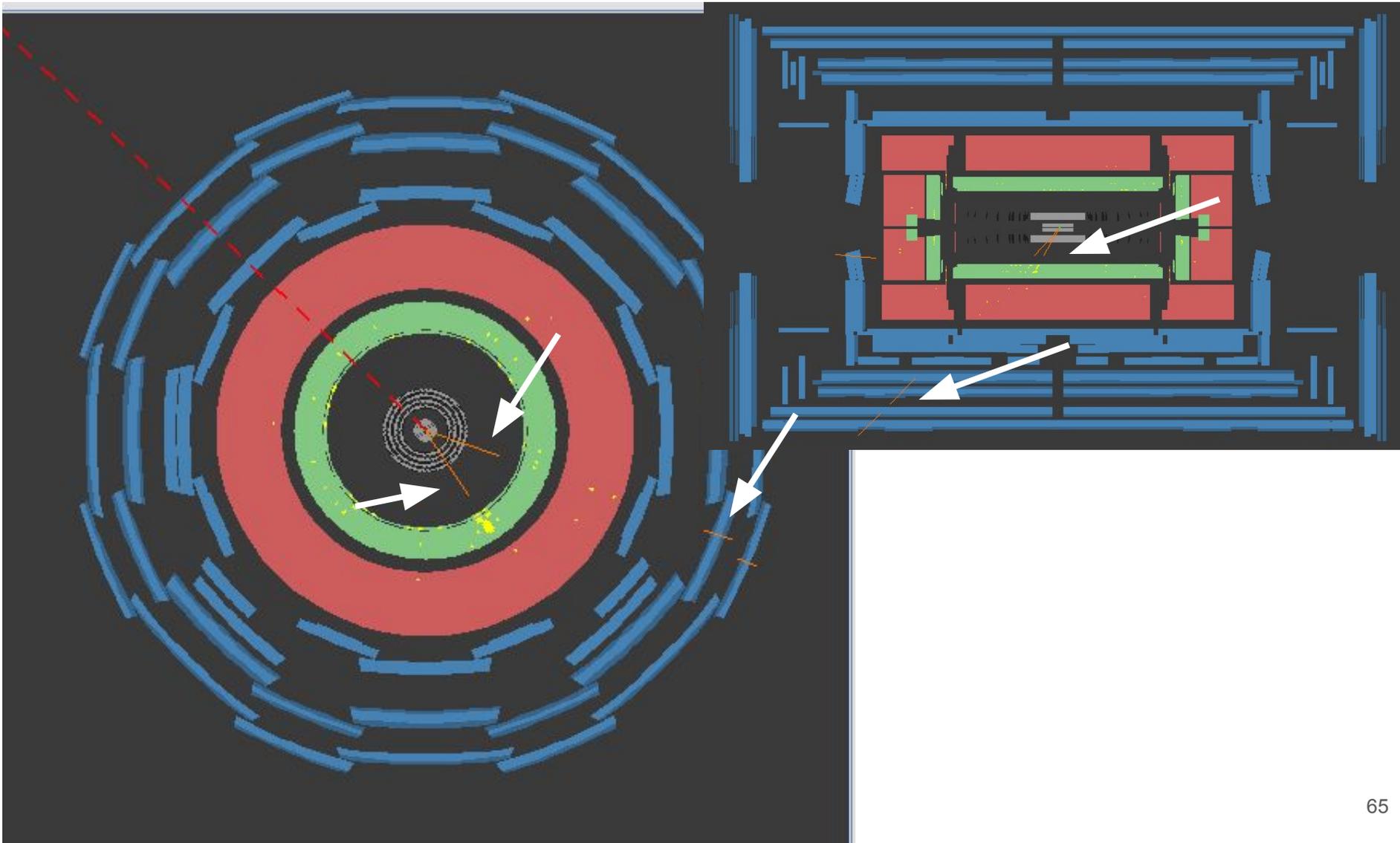
Przypadek #3

Liczba leptonów – elektronów i mionów?



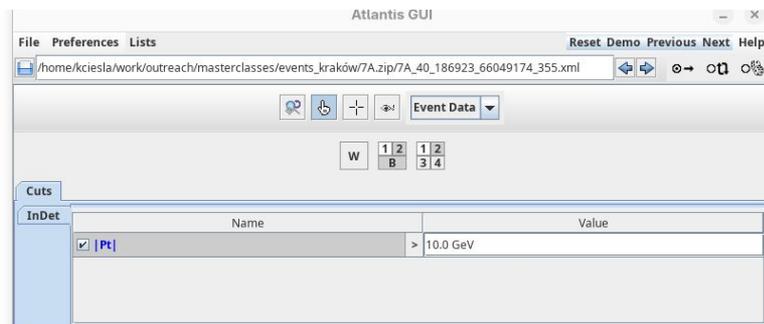
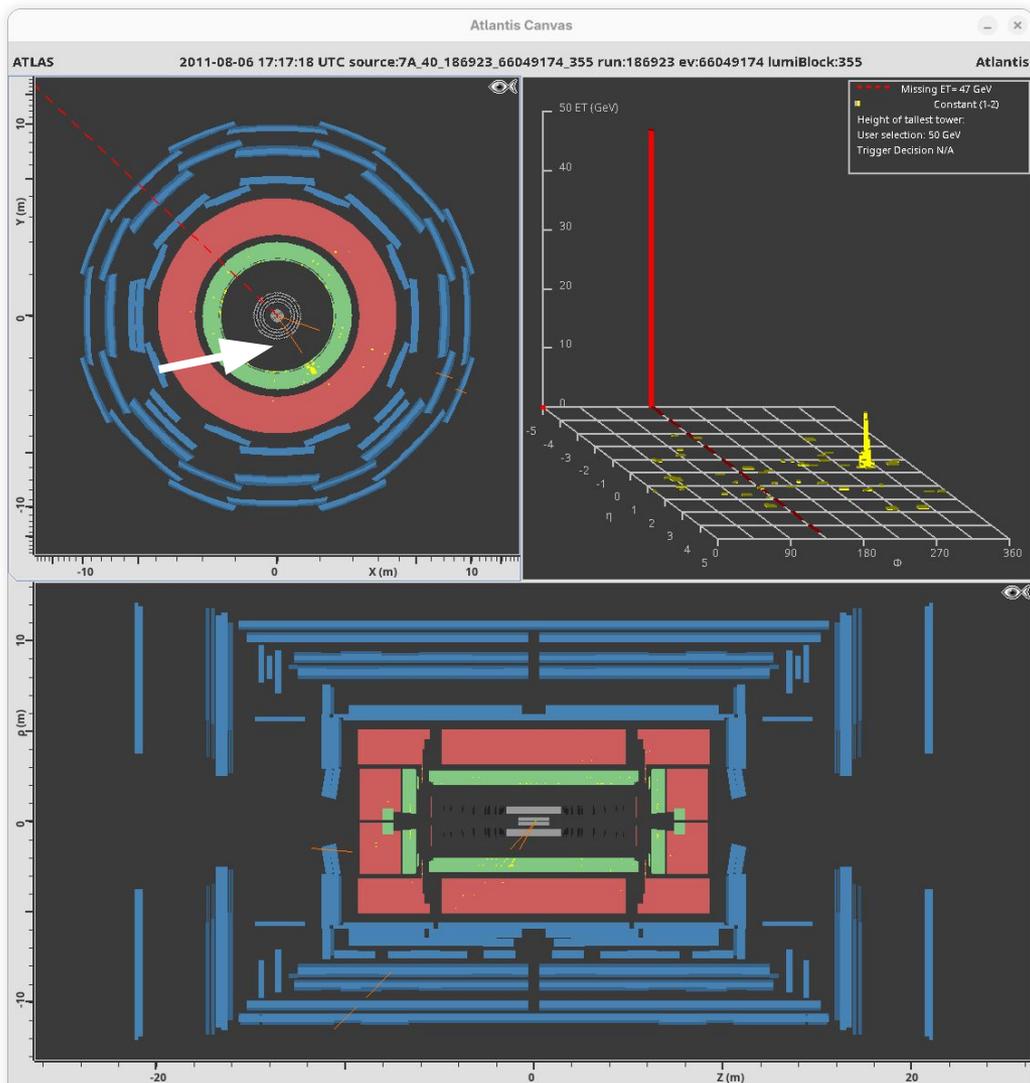
Przypadek #3

Kandydat na mion
Kandydat na elektron



Przypadek #3

$p_T \text{ leptonu}^{(1)} > 20 \text{ GeV?}$
 $p_T \text{ leptonu}^{(2)} > 10 \text{ GeV?}$



InDetTrack index: 72

PT = 24.949 GeV

$\eta = -0.402$

$\Phi = 302.431^\circ$

$P_x = 13.380 \text{ GeV}$

$P_y = -21.058 \text{ GeV}$

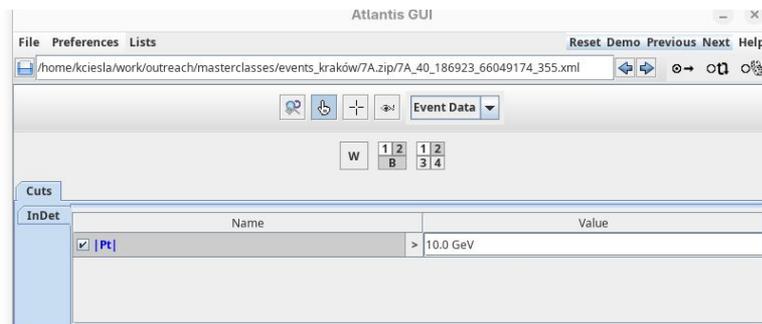
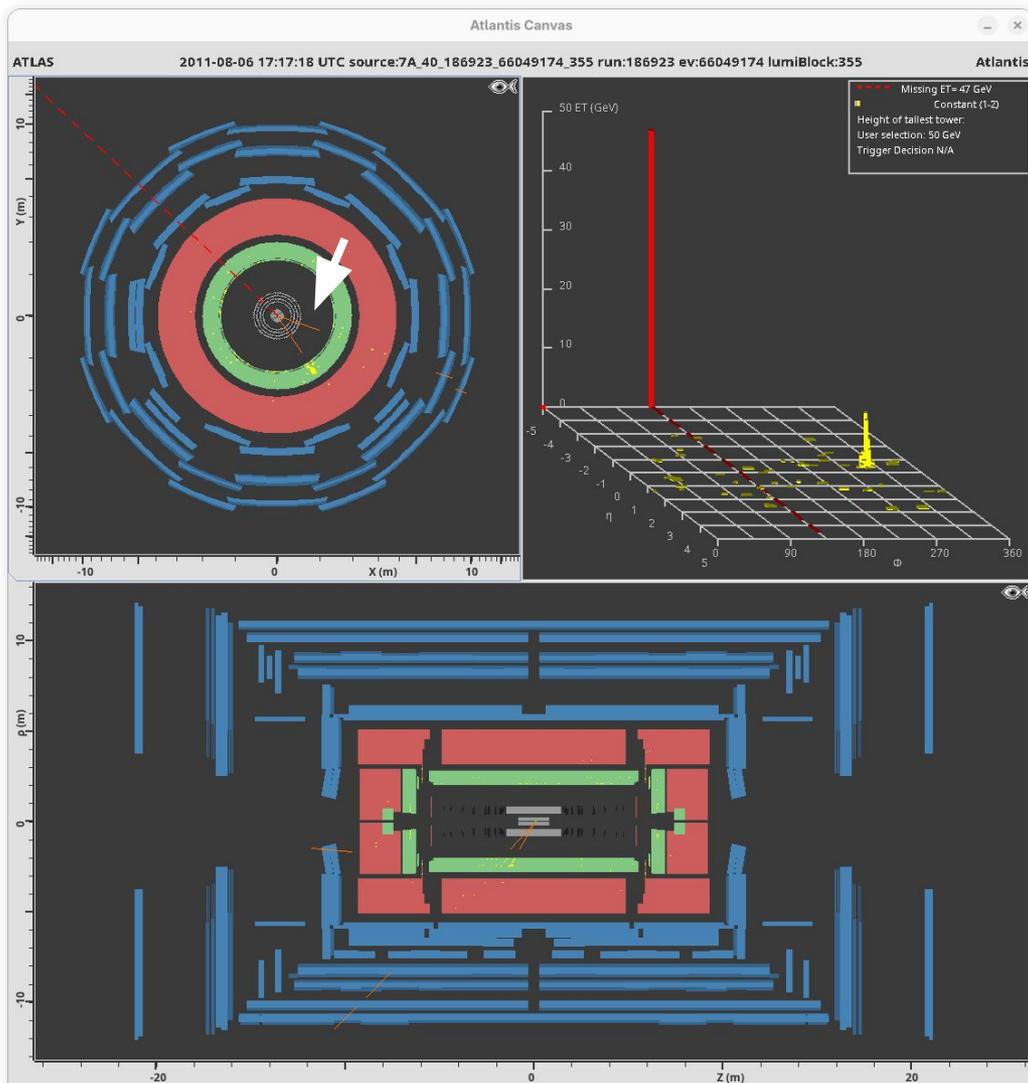
$P_z = -10.305 \text{ GeV}$

Charge = -1

Isolation = 0.00

Przypadek #3

$p_T \text{ leptonu}^{(1)} > 20 \text{ GeV}$
 $p_T \text{ leptonu}^{(2)} > 10 \text{ GeV}$



InDetTrack index: 5

PT = 20.045 GeV

$\eta = -0.622$

$\Phi = 342.036^\circ$

$P_x = 19.068 \text{ GeV}$

$P_y = -6.182 \text{ GeV}$

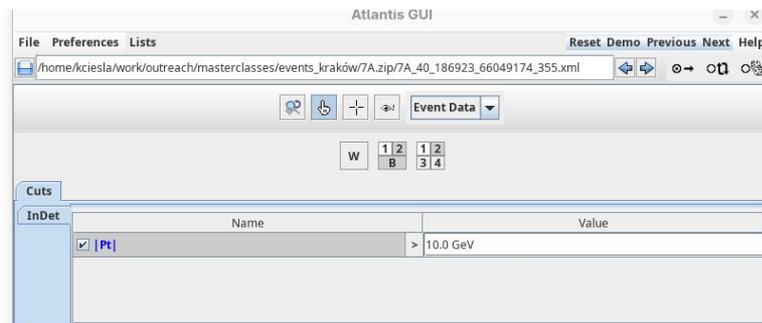
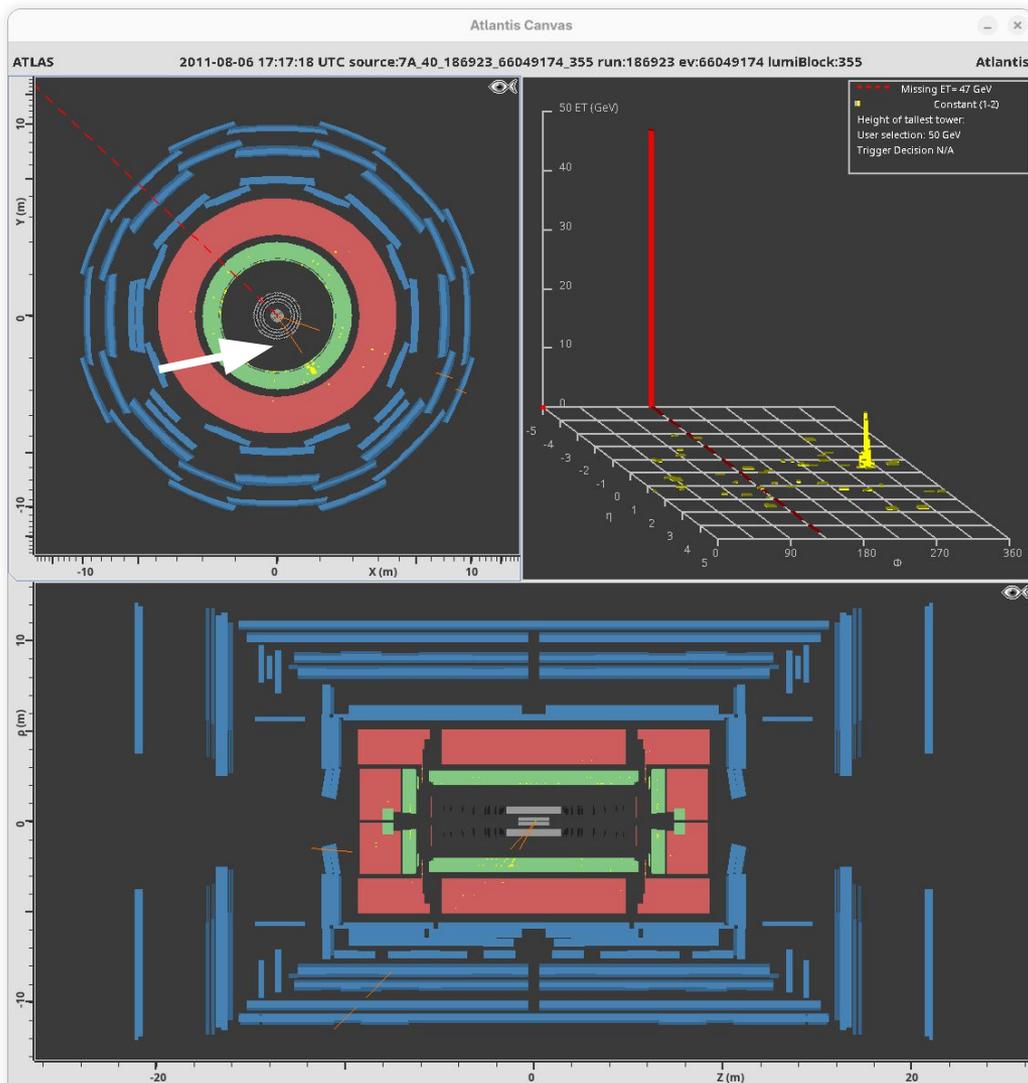
$P_z = -13.278 \text{ GeV}$

Charge = 1

Isolation = 0.00

Przypadek #3

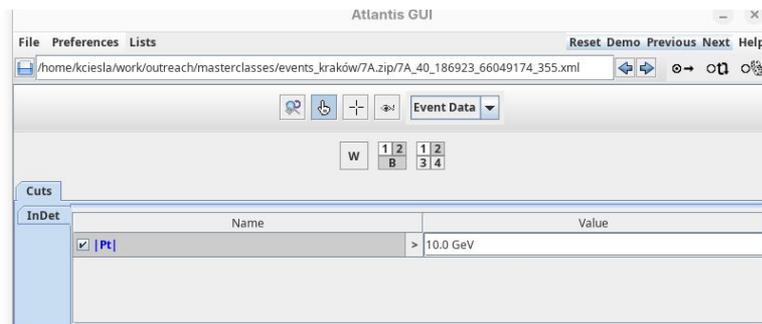
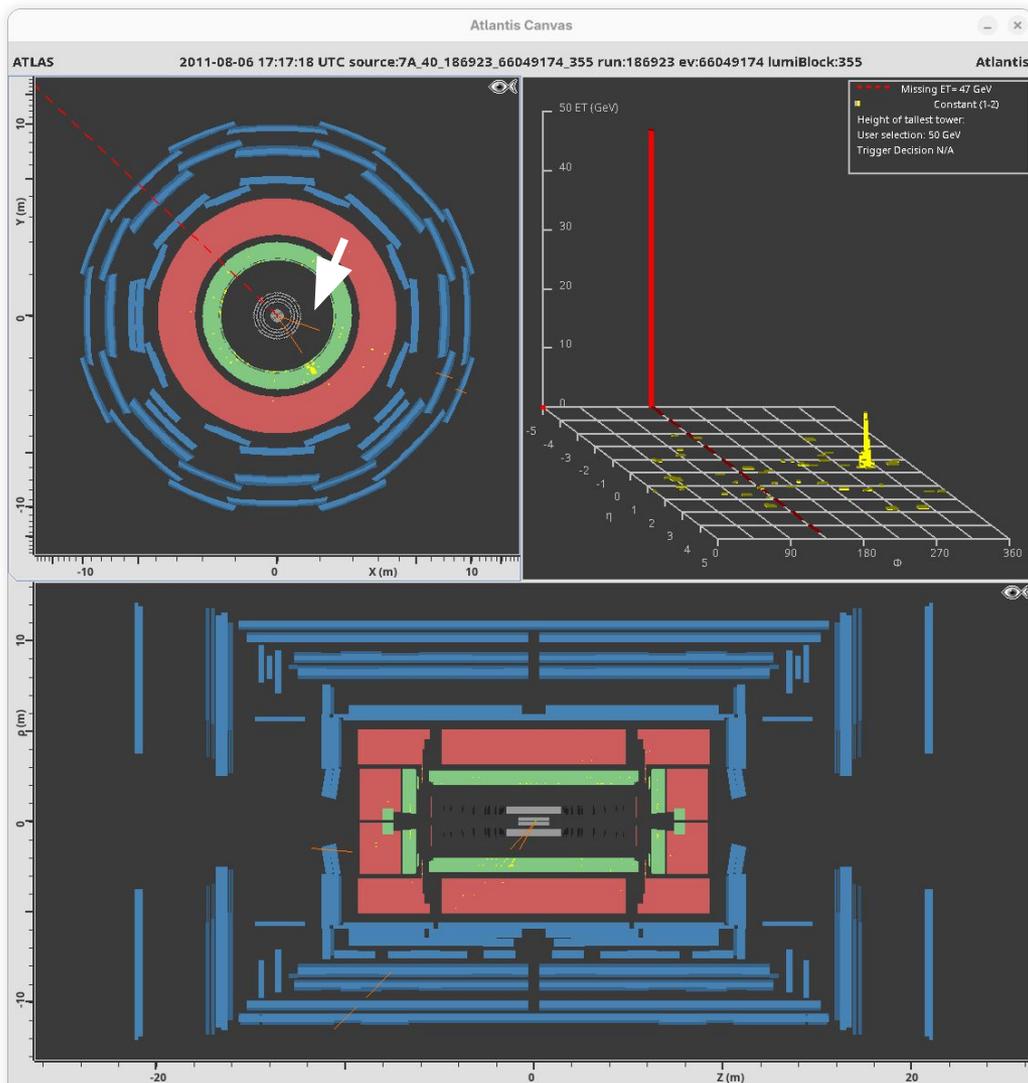
Brak pobliskich śladów?
Izolacja < 0.2?



InDetTrack index: 72
PT = 24.949 GeV
 $\eta = -0.402$
 $\Phi = 302.431^\circ$
Px = 13.380 GeV
Py = -21.058 GeV
Pz = -10.305 GeV
Charge = -1
Isolation = 0.00

Przypadek #3

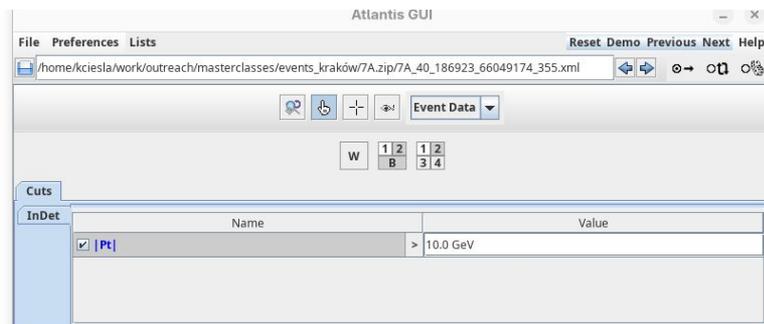
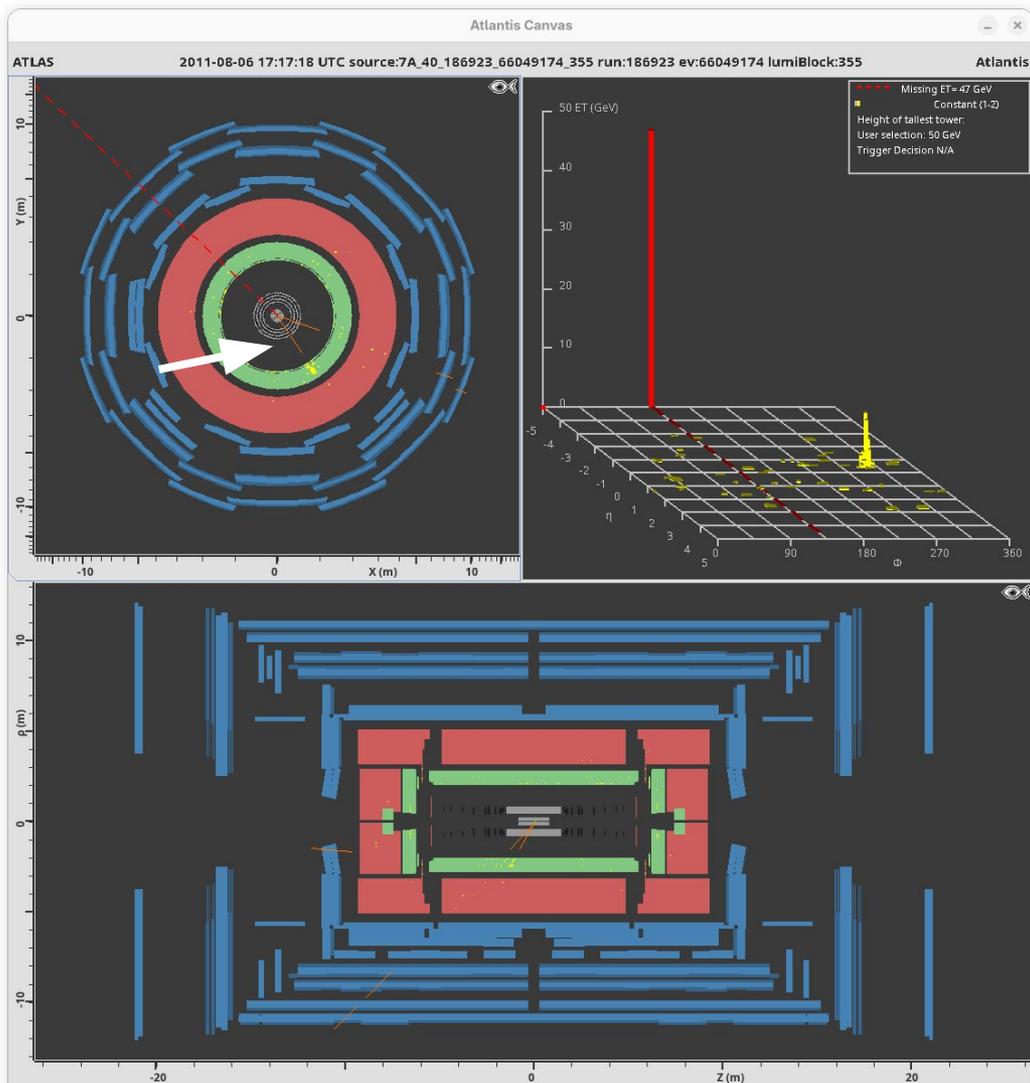
Brak pobliskich śladów
Izolacja < 0.2



InDetTrack index: 5
PT = 20.045 GeV
 $\eta = -0.622$
 $\Phi = 342.036^\circ$
Px = 19.068 GeV
Py = -6.182 GeV
Pz = -13.278 GeV
Charge = 1
Isolation = 0.00

Przypadek #3

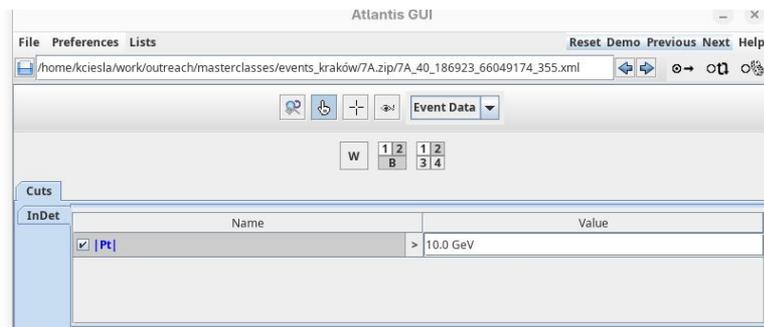
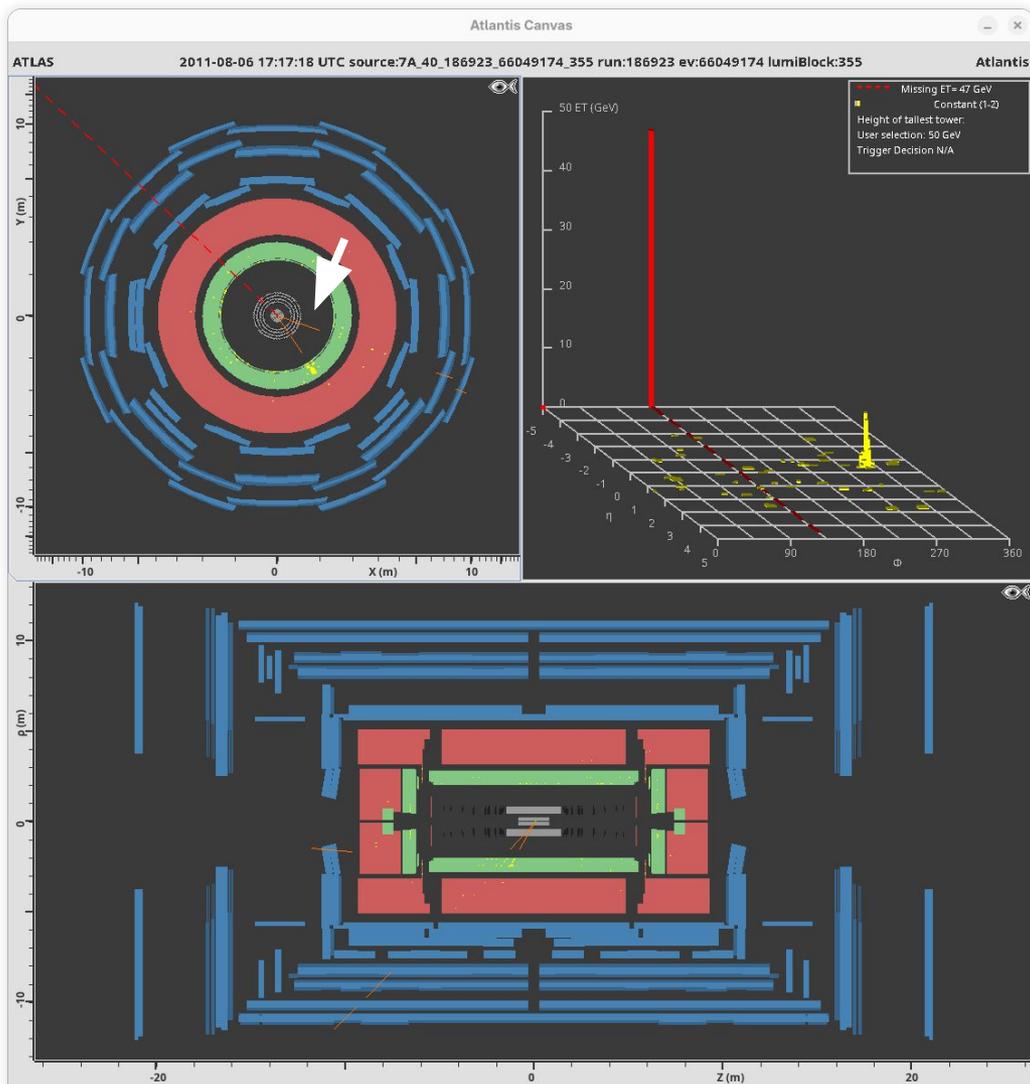
Przeciwny ładunek?



InDetTrack index: 72
PT = 24.949 GeV
 $\eta = -0.402$
 $\Phi = 302.431^\circ$
Px = 13.380 GeV
Py = -21.058 GeV
Pz = -10.305 GeV
Charge = -1
Isolation = 0.00

Przypadek #3

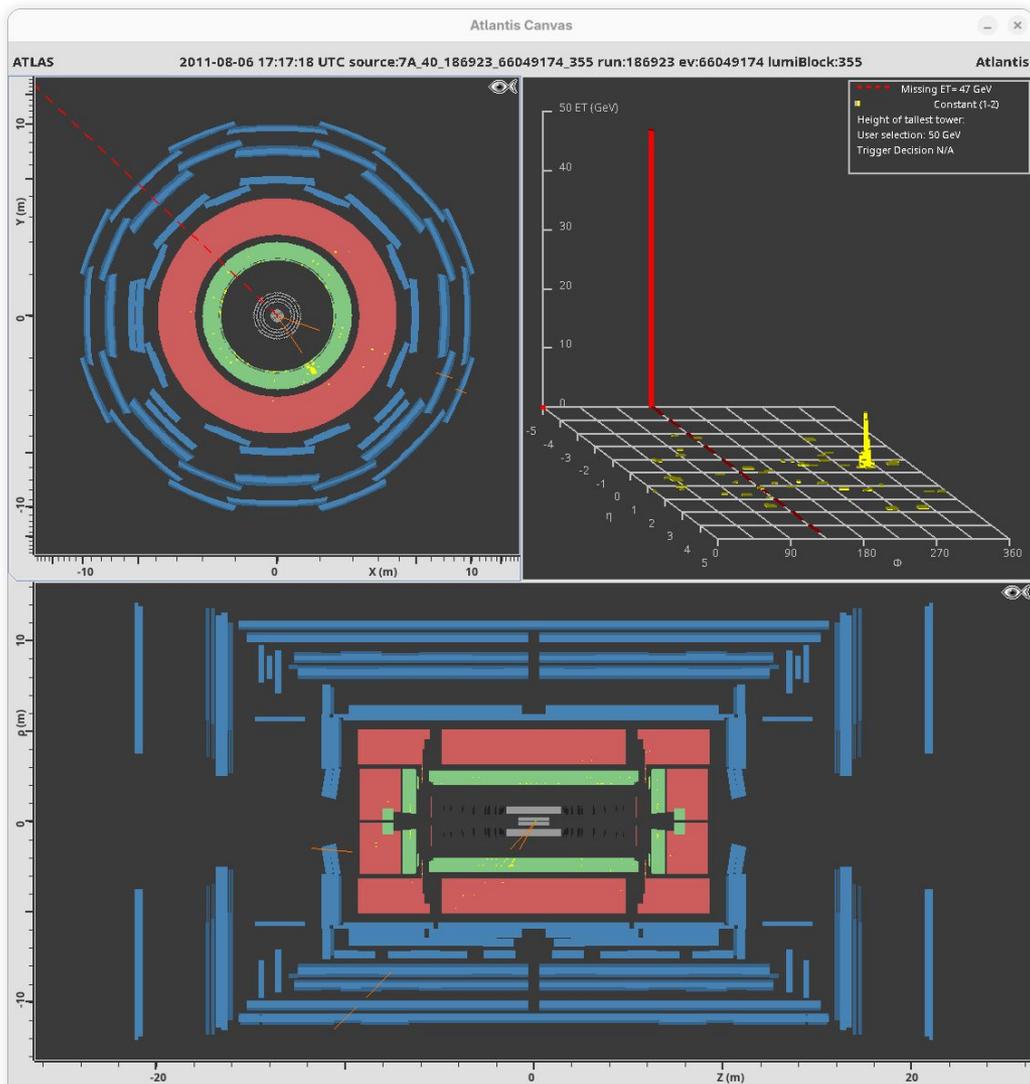
Przeciwny ładunek



InDetTrack index: 5
PT = 20.045 GeV
 $\eta = -0.622$
 $\Phi = 342.036^\circ$
Px = 19.068 GeV
Py = -6.182 GeV
Pz = -13.278 GeV
Charge = 1
Isolation = 0.00

Przypadek #3

Ten sam wierzchołek?



Atlantis GUI

File Preferences Lists Reset Demo Previous Next Help

/home/kciesla/work/outreach/masterclasses/events_krakow/7A.zip/7A_40_186923_66049174_355.xml

Event Data

W 1 2 1 2
B 3 4

Cuts

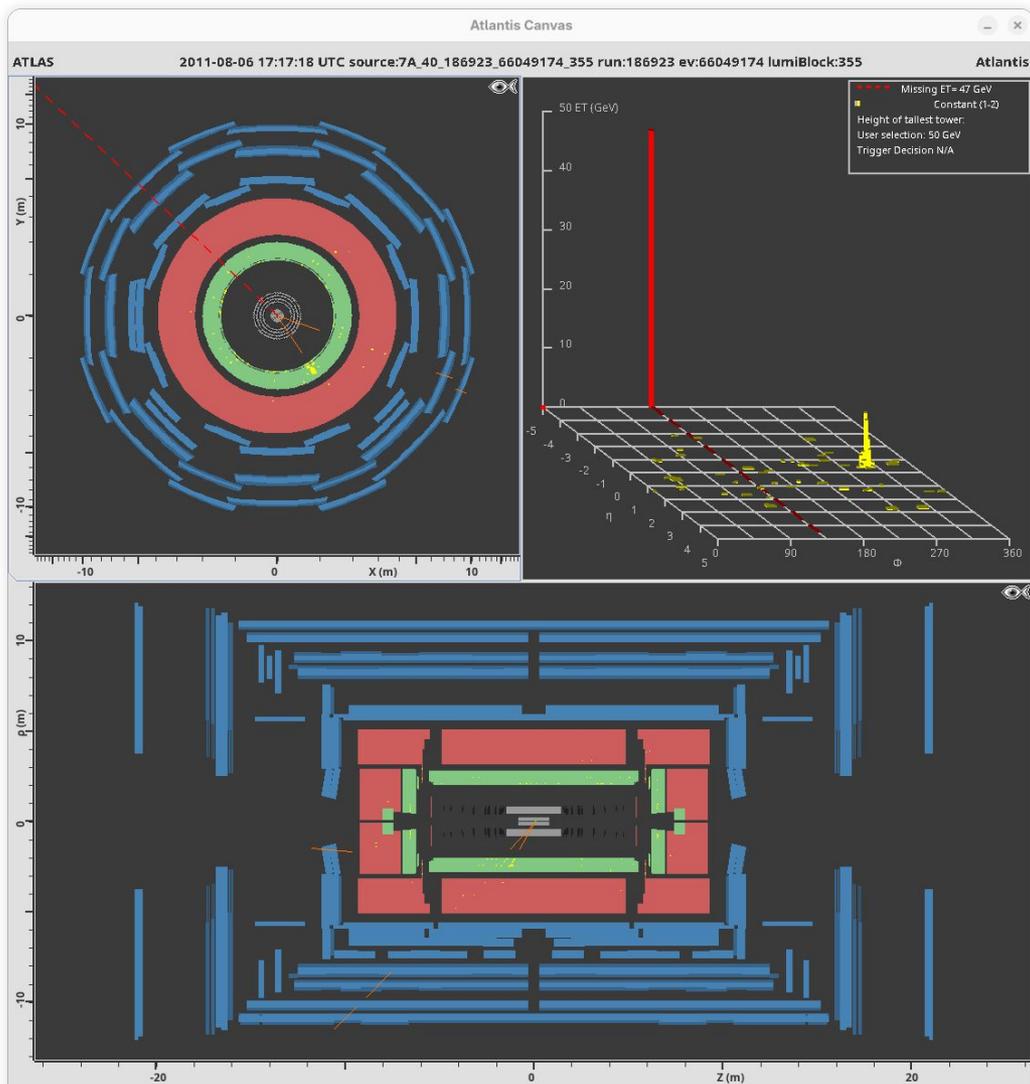
InDet

Name	Value
<input checked="" type="checkbox"/> Pt	> 10.0 GeV

The screenshot shows the Atlantis GUI interface. The main window displays the event data for the selected event. The 'Cuts' panel shows a cut on the transverse momentum (Pt) of the leading track, set to be greater than 10.0 GeV. The 'W' and 'B' buttons are visible, indicating the presence of a W boson and a b quark in the event.

Przypadek #3

Ten sam wierzchołek?



Atlantis GUI

File Preferences Lists Reset Demo Previous Next Help

/home/kciesla/work/outreach/masterclasses/events_krakow/7A.zip/7A_40_186923_66049174_355.xml

W 1 2 1 2
B 3 4

Cuts

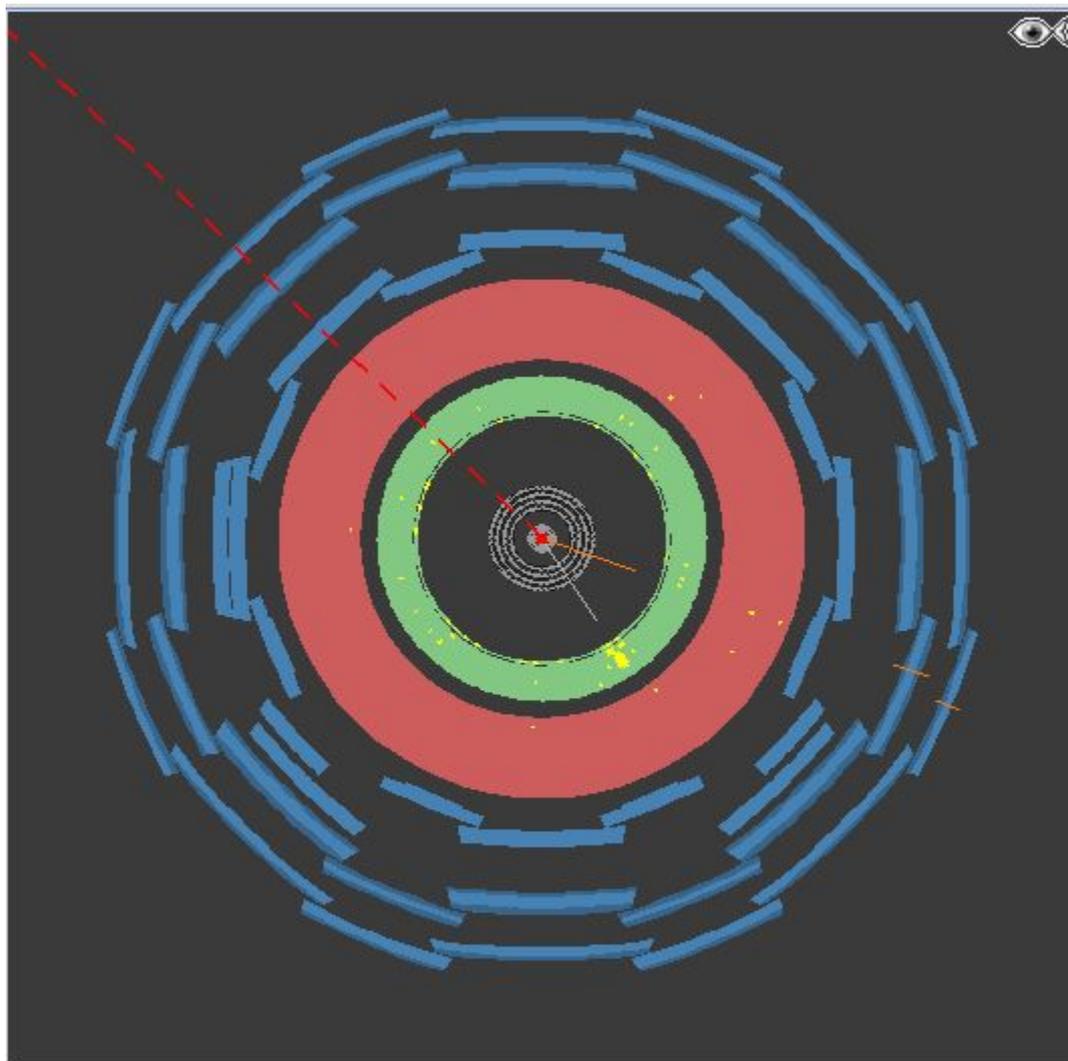
InDet

Name	Value
<input checked="" type="checkbox"/> Pt	> 10.0 GeV

The Atlantis GUI shows a cut configuration for the InDet Pt. A red arrow points to the 'W' button, which is used to add or modify cuts. The cut configuration table shows a single cut for Pt with a value of > 10.0 GeV.

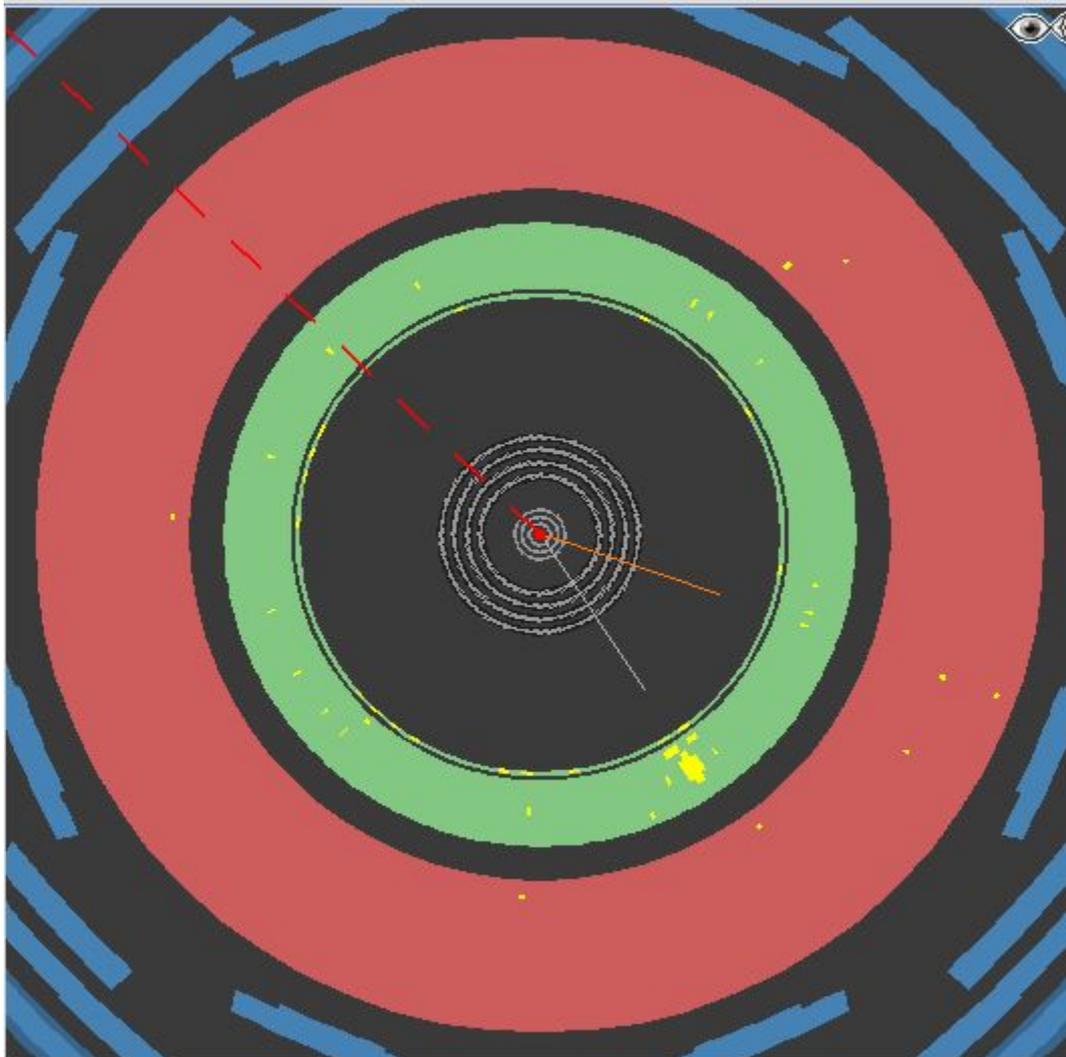
Przypadek #3

Ten sam wierzchołek?



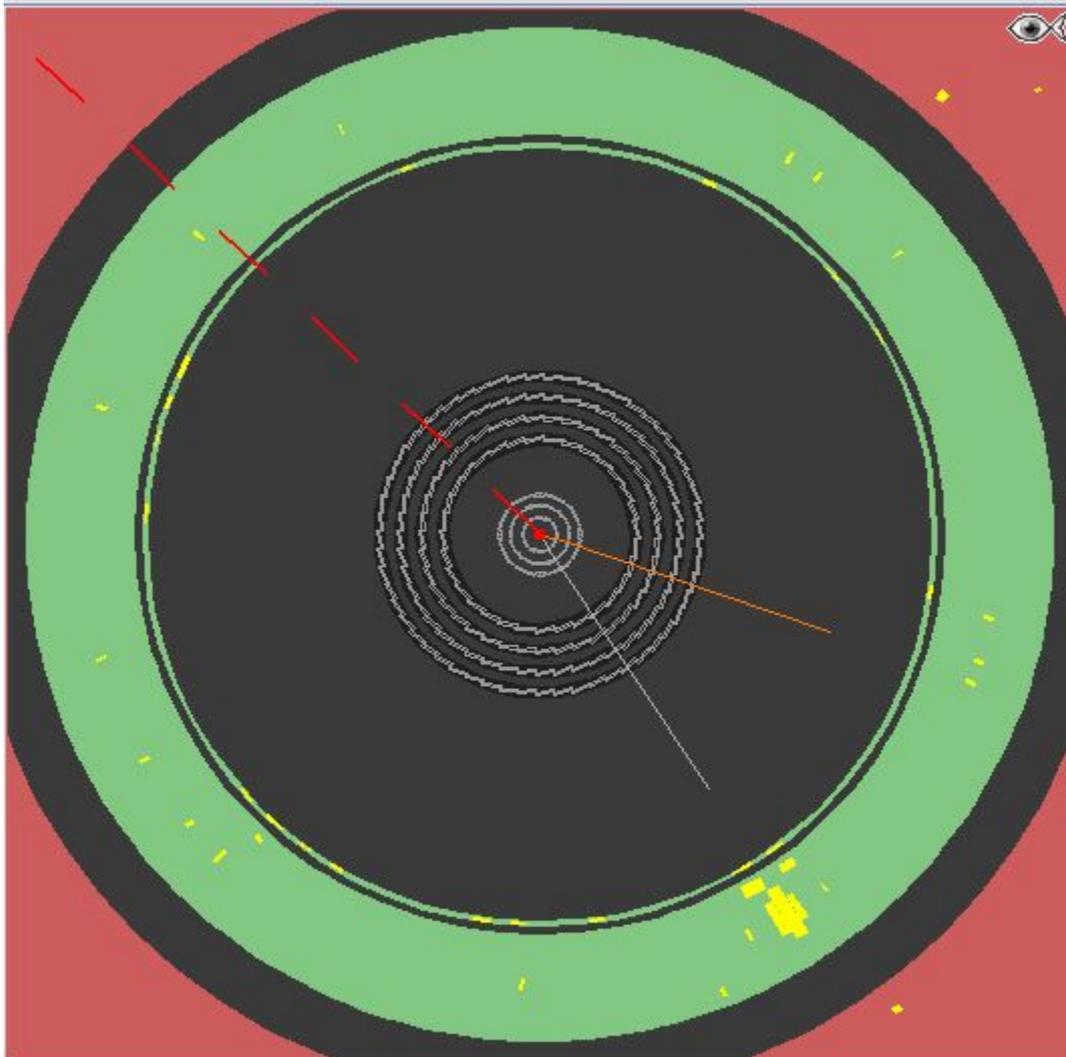
Przypadek #3

Ten sam wierzchołek?



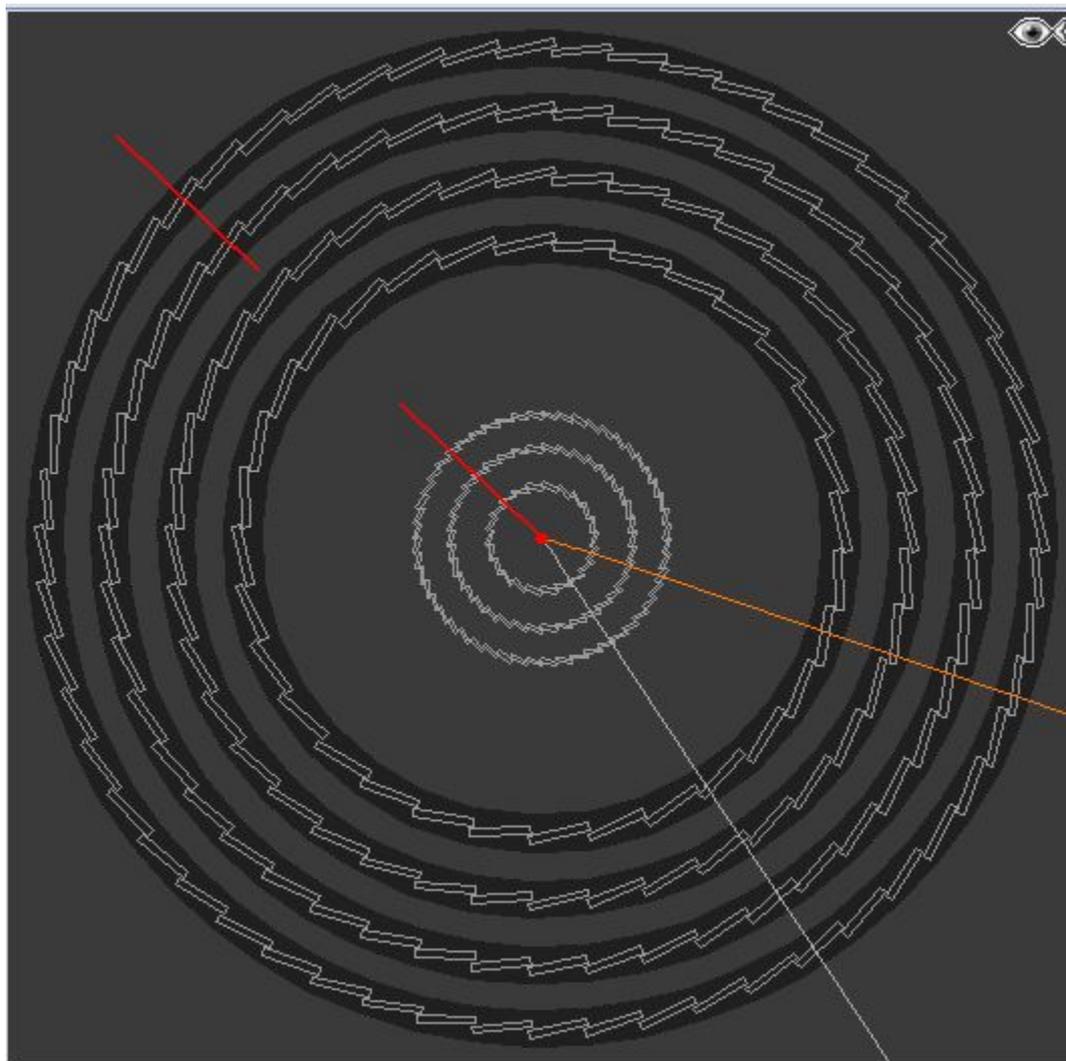
Przypadek #3

Ten sam wierzchołek?



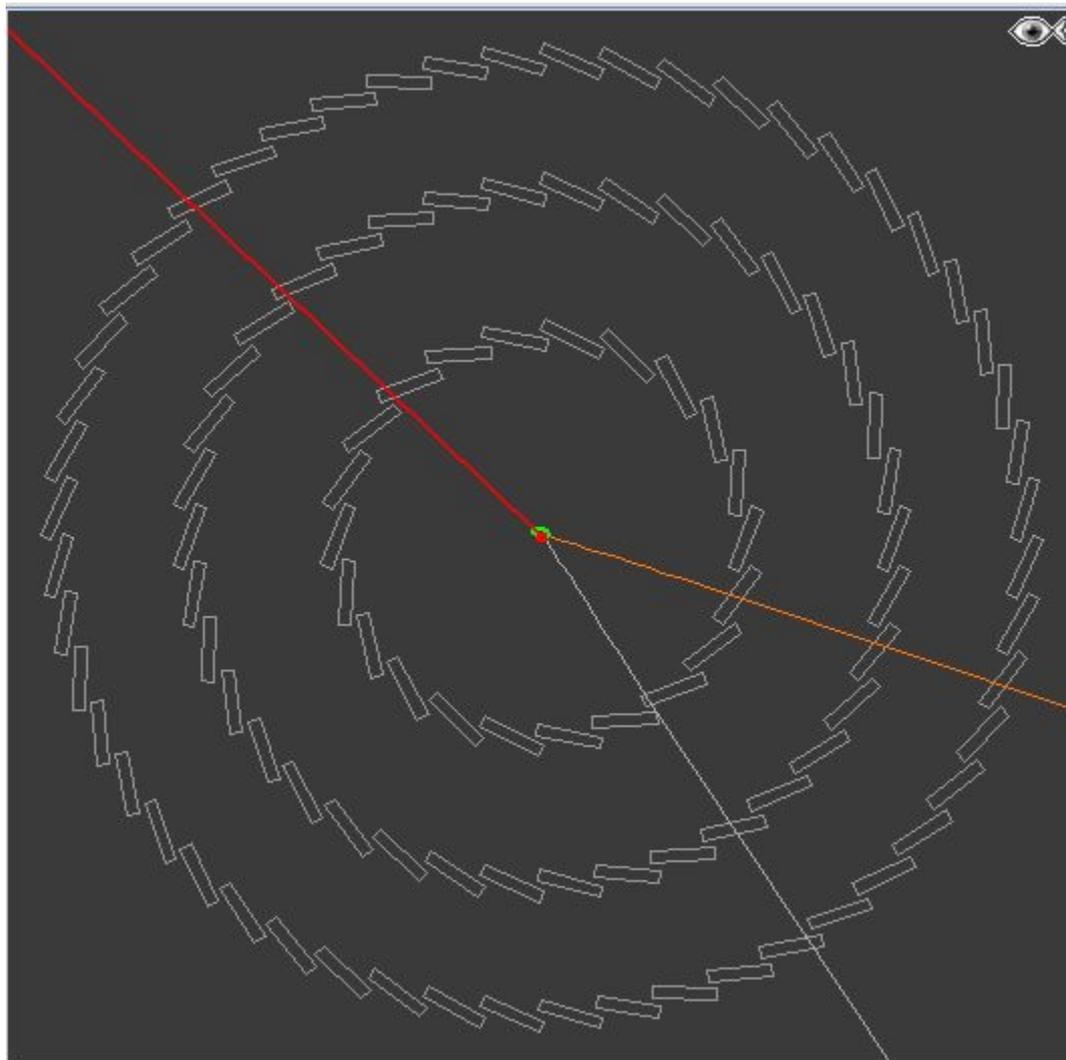
Przypadek #3

Ten sam wierzchołek?



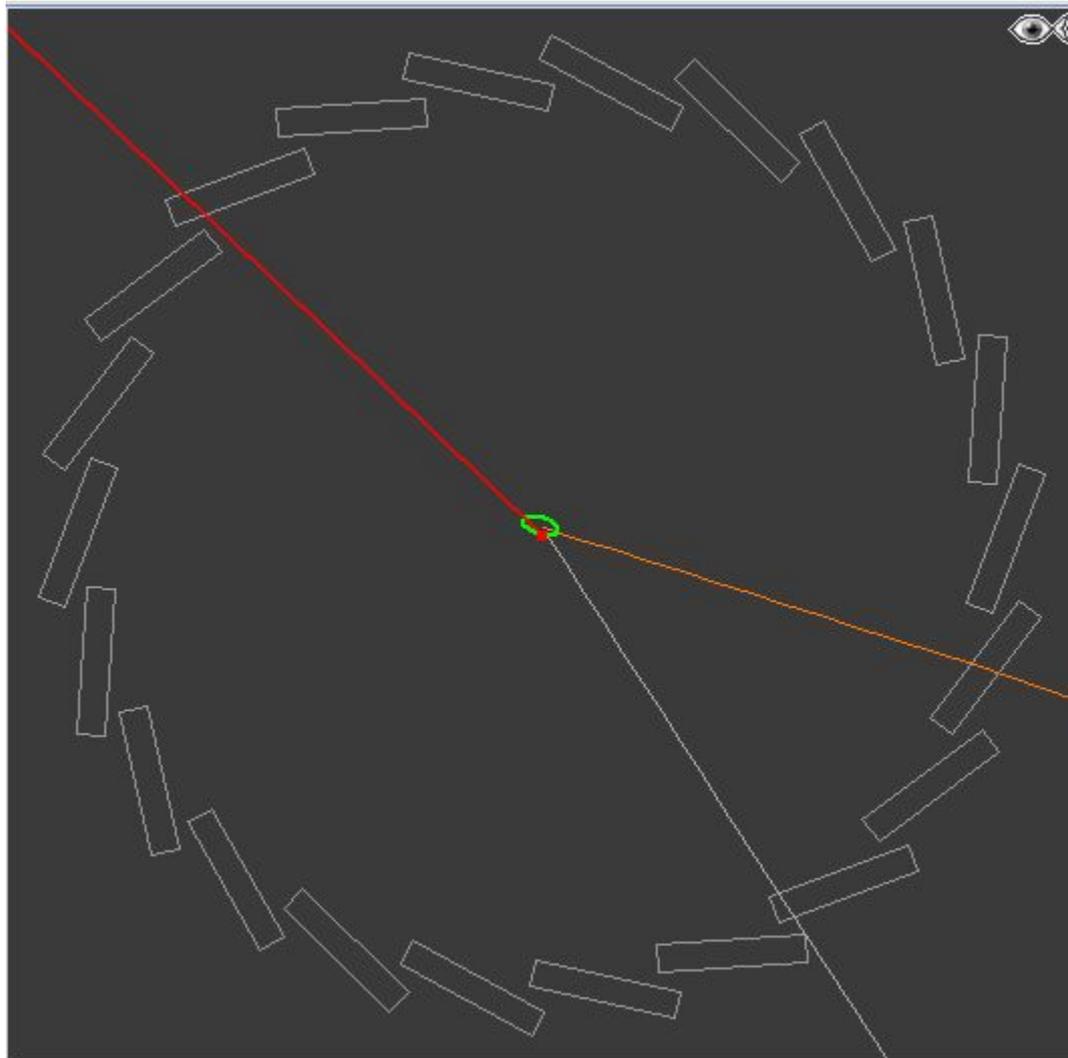
Przypadek #3

Ten sam wierzchołek?



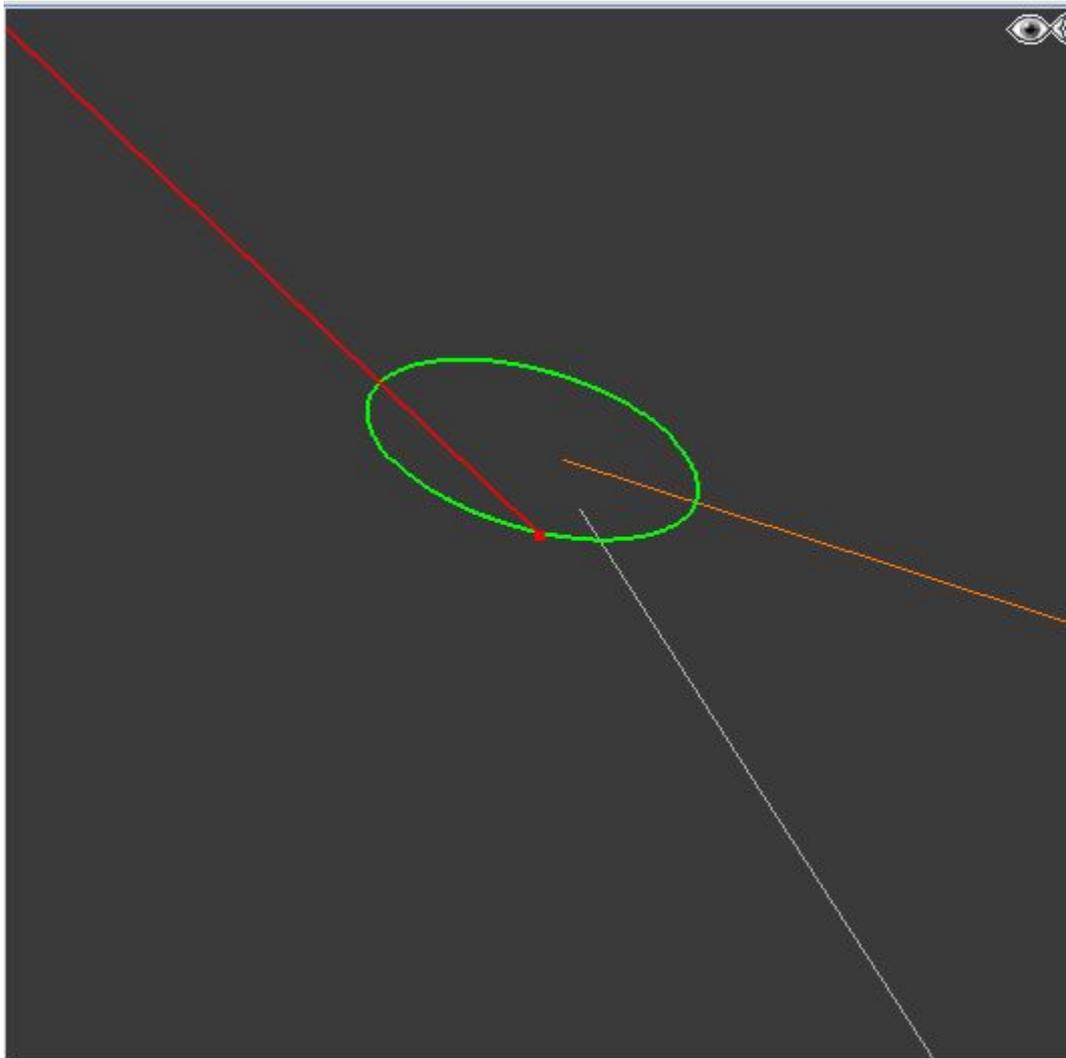
Przypadek #3

Ten sam wierzchołek?



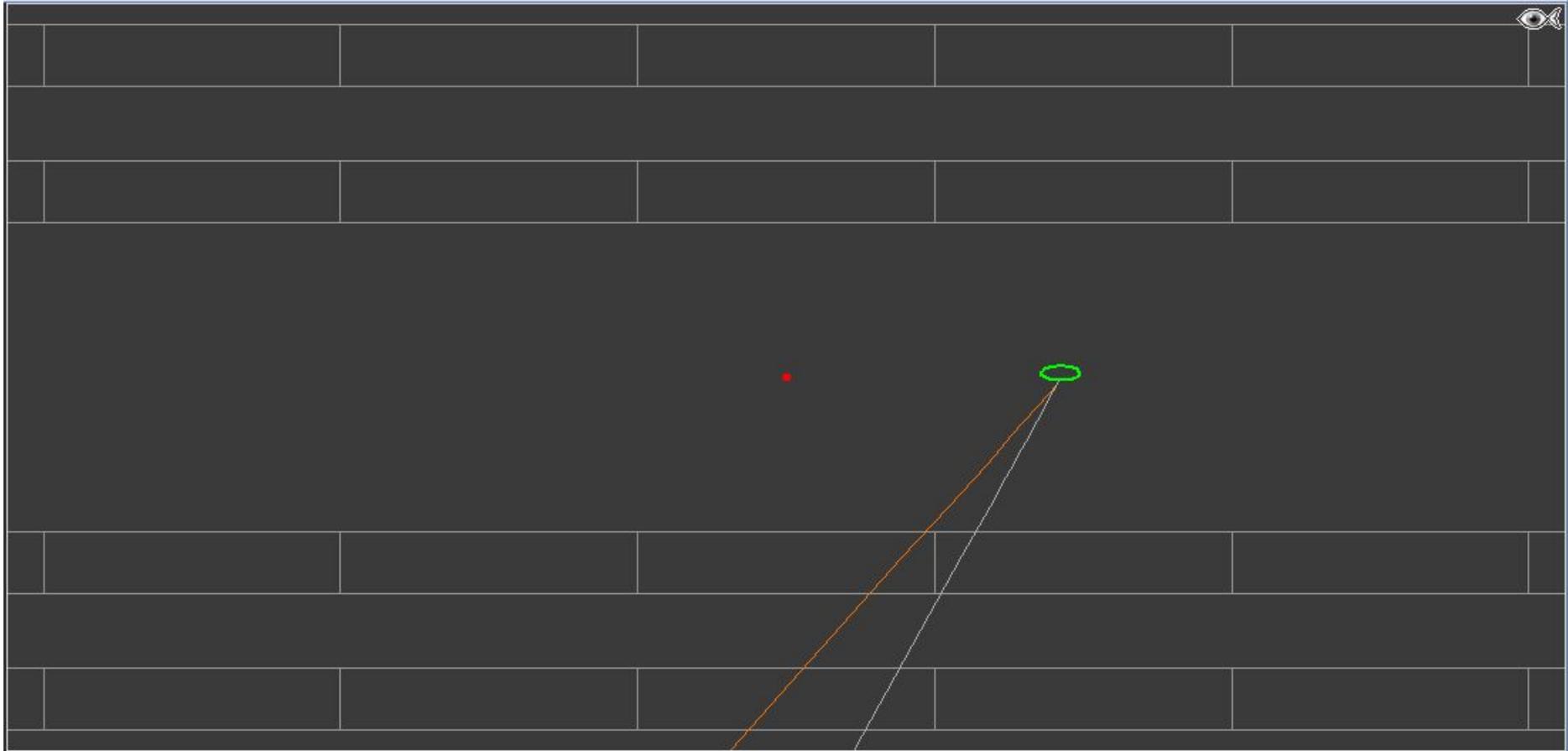
Przypadek #3

Ten sam wierzchołek?



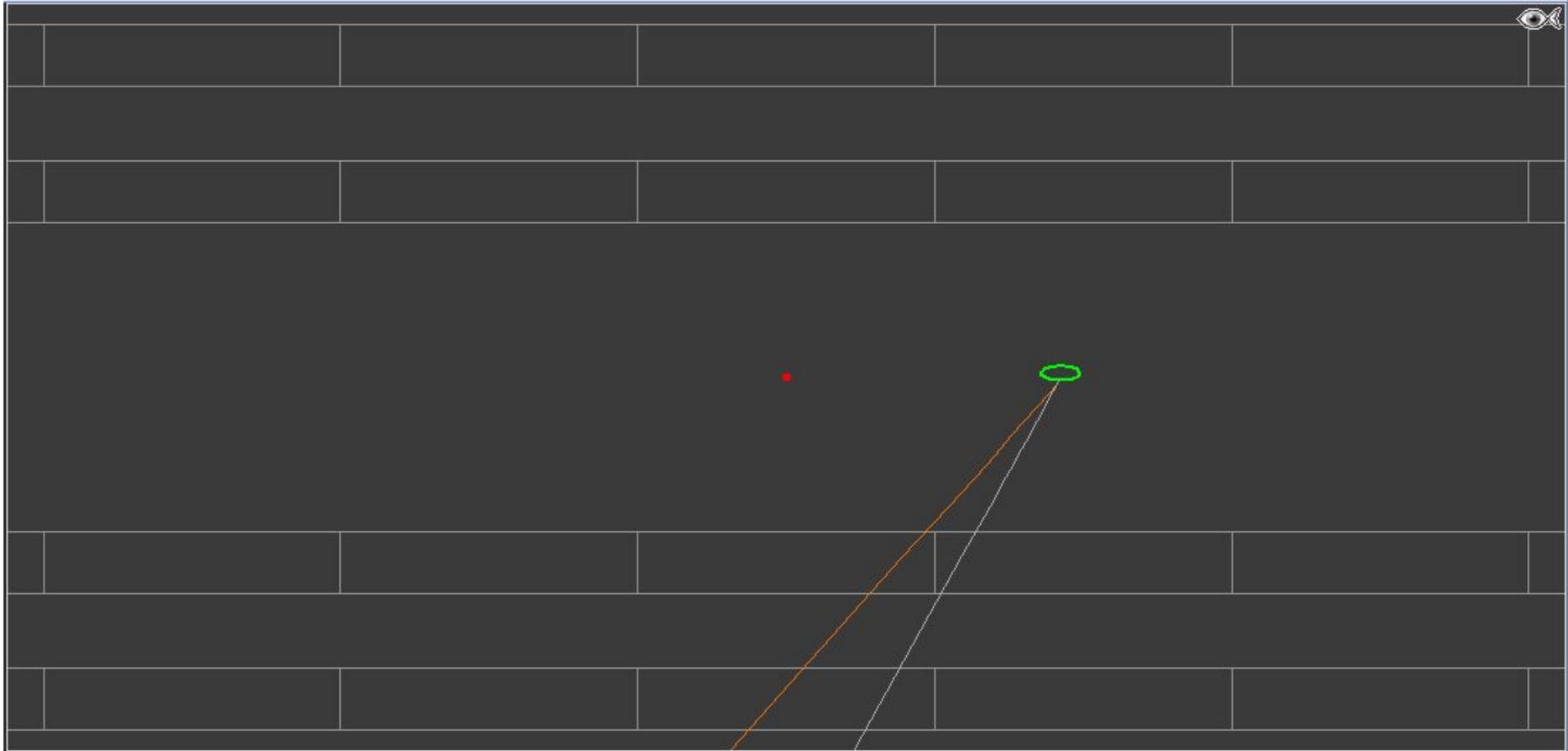
Przypadek #3

Ten sam wierzchołek?



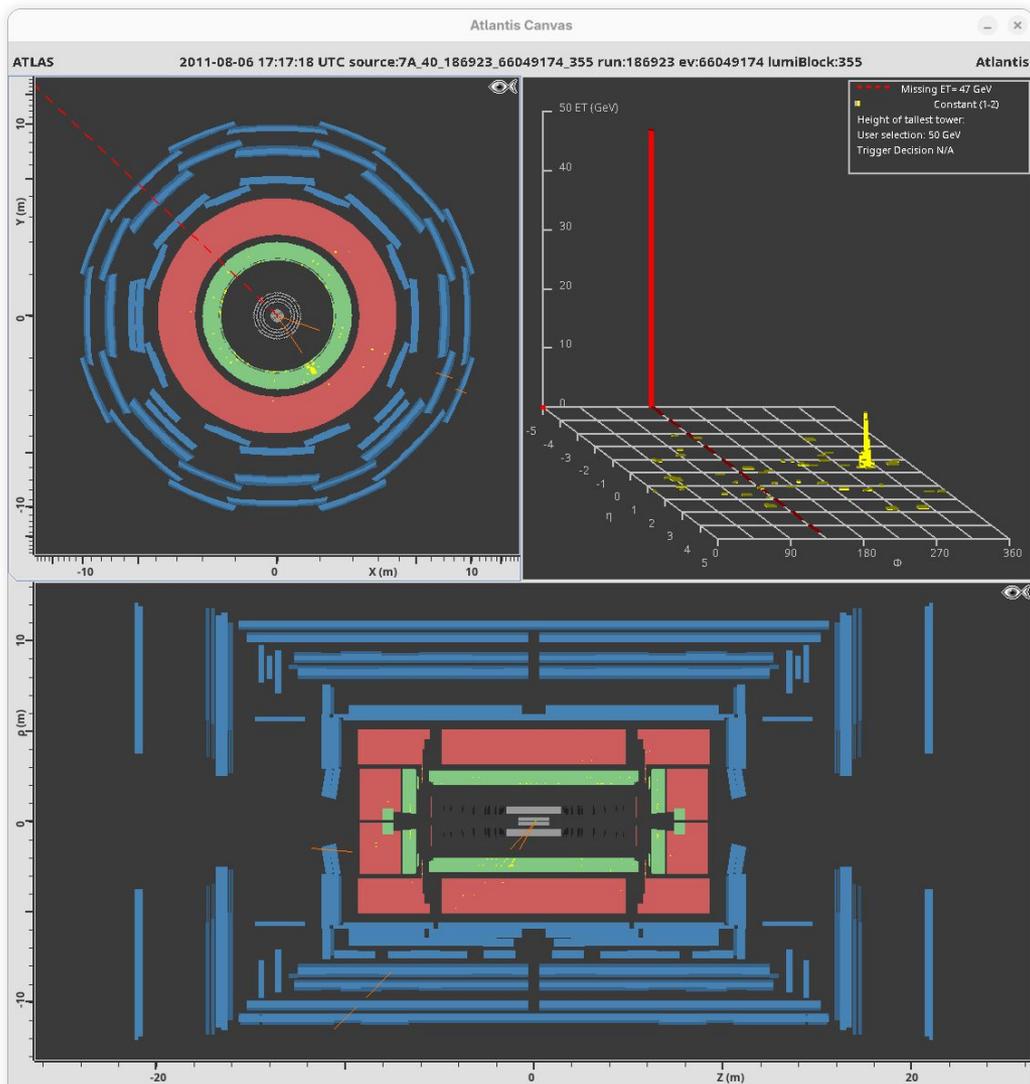
Przypadek #3

Ten sam wierzchołek



Przypadek #3

ee lub $\mu\mu$: MET > 40 GeV?
 $e\mu$: MET > 20 GeV?



Atlantis GUI

File Preferences Lists Reset Demo Previous Next Help

/home/kciesla/work/outreach/masterclasses/events_krakow/7A.zip/7A_40_186923_66049174_355.xml

Event Data

W 1 2 1 2
B 3 4

Cuts

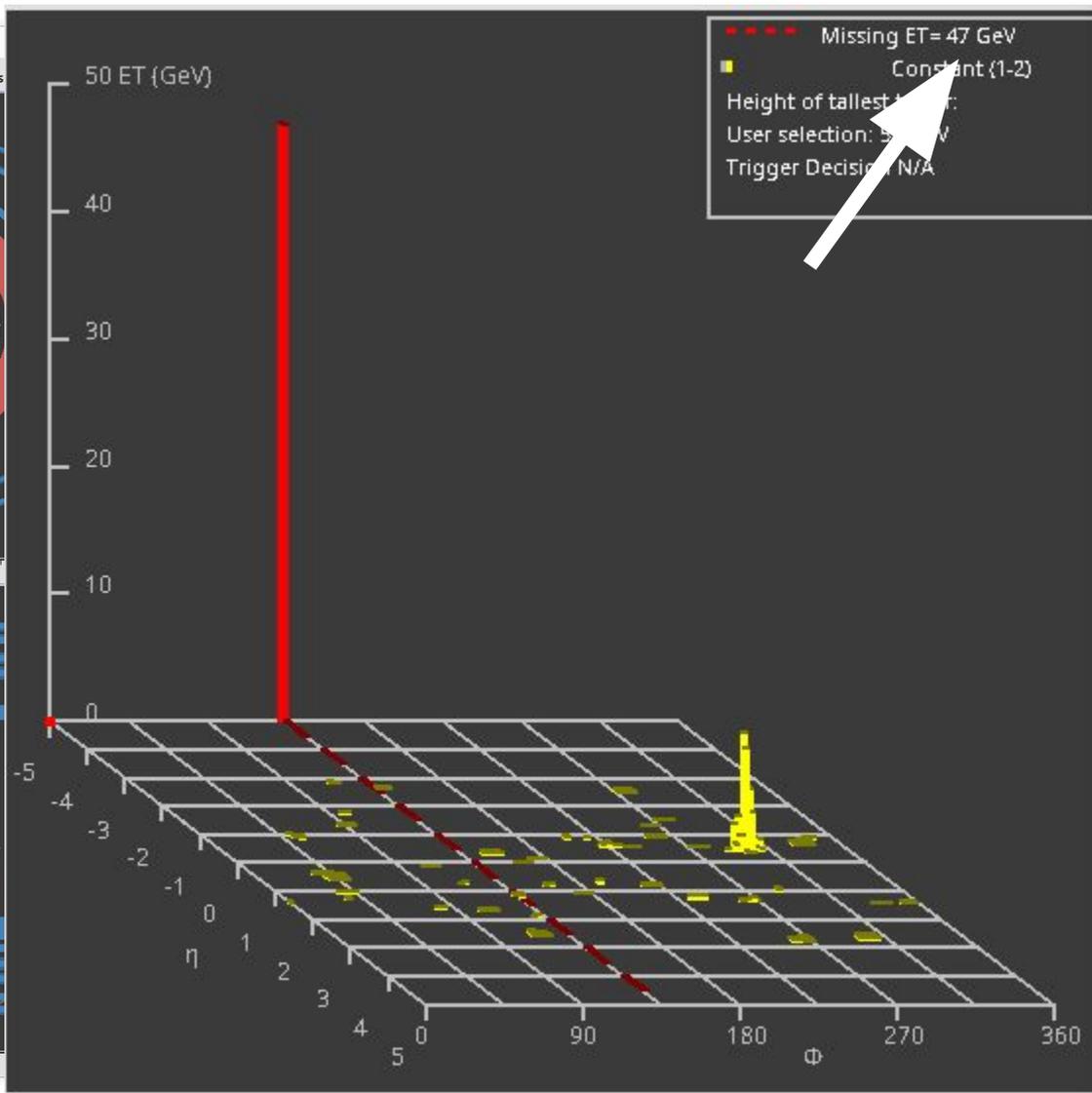
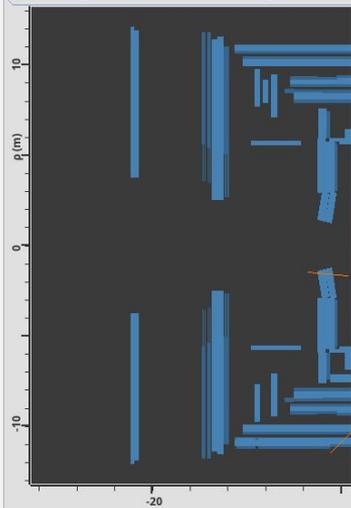
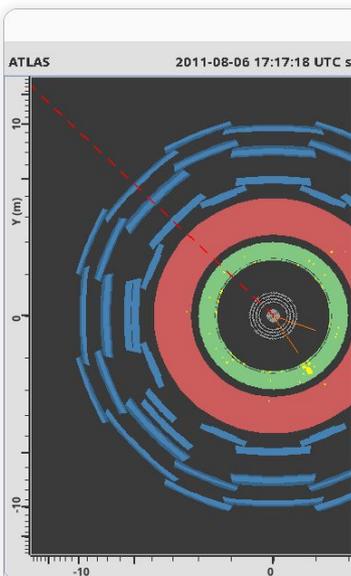
InDet

Name	Value
<input checked="" type="checkbox"/> Pt	> 10.0 GeV

3

Przypadek #3

$e\mu$: MET > 20 GeV



Reset Demo Previous Next Help

0_186923_66049174_355.xml

Event Data

1 2
3 4

Value

10.0 GeV

Przypadek #3

$W^+W^- \rightarrow l\nu l\nu$
pomiar kąta

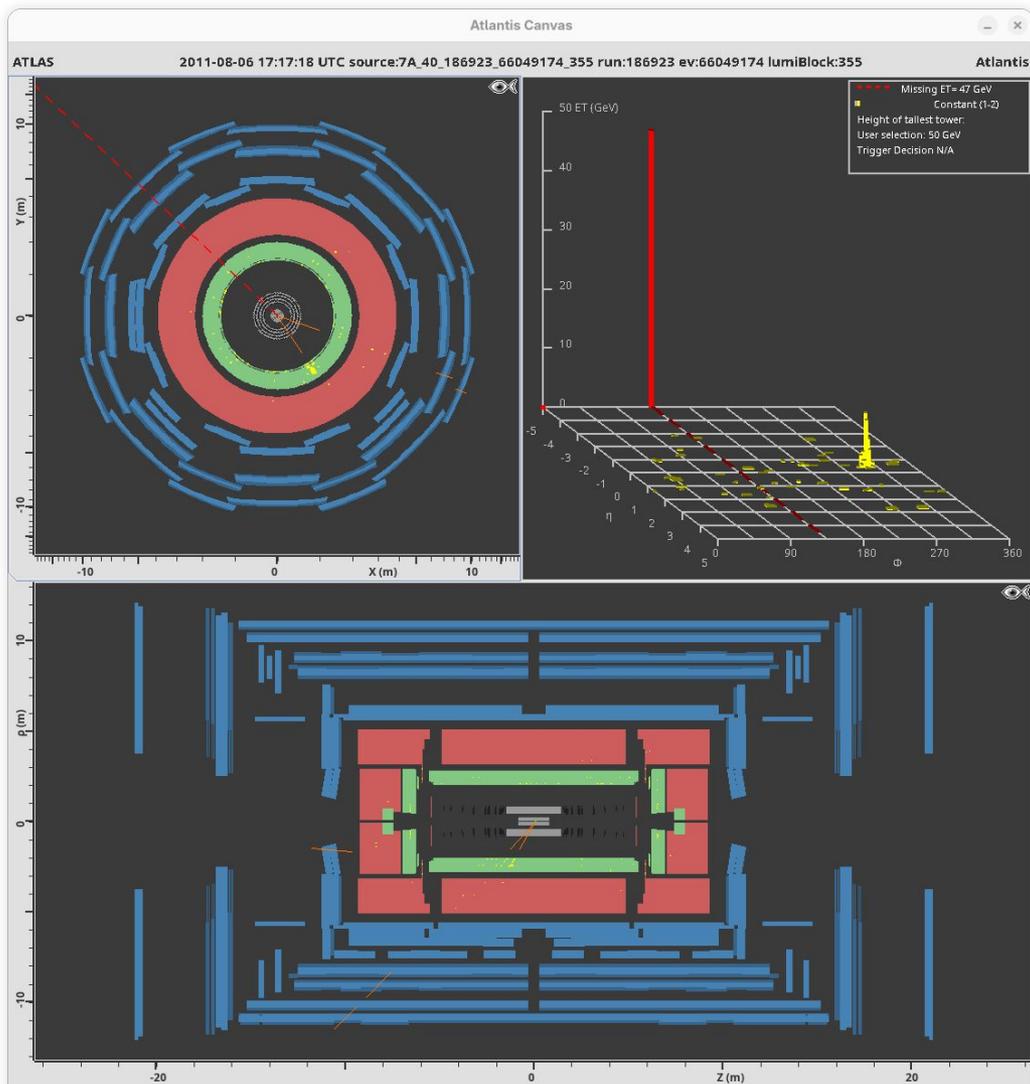
ATLAS data analysis

data sample: 5B

event number	signal with 1 lepton (I)				signal with 2 leptons (II)		Back-ground	Comment
	$W \rightarrow \nu + \dots$		$W \rightarrow \nu + \dots$		$WW \rightarrow l^+ \nu l^- \nu$	$\Delta\phi_{ll}$ round off to whole number		
	e^+	e^-	μ^+	μ^-				
1				X				
2						X		
3					X			
4								
5								
6								
7								
8								
9								
10								

Przypadek #3

$W^+W^- \rightarrow l\nu l\nu$
pomiar kąta



Atlantis GUI

File Preferences Lists Reset Demo Previous Next Help

/home/kciesla/work/outreach/masterclasses/events_krakow/7A.zip/7A_40_186923_66049174_355.xml

Event Data

W 1 2 1 2
B 3 4

Cuts

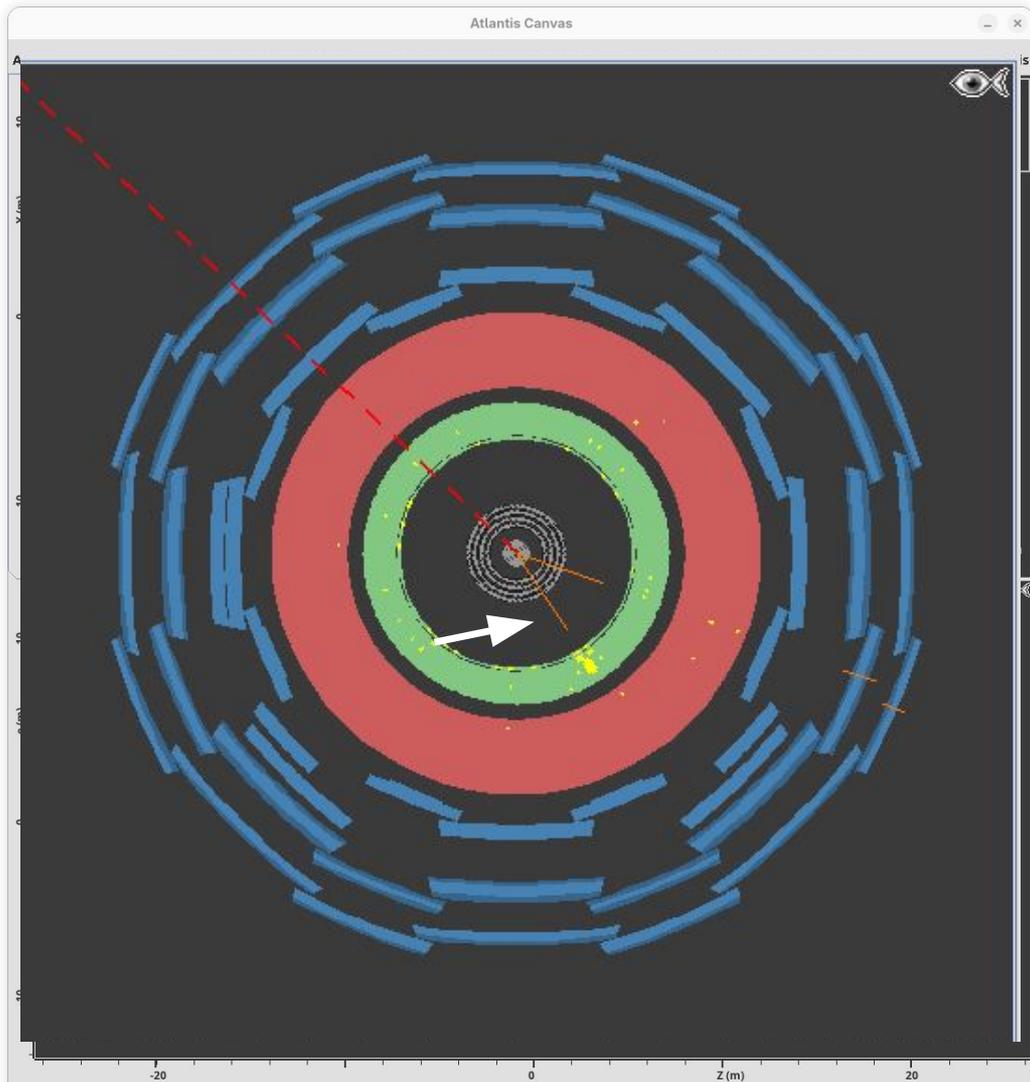
InDet

Name	Value
<input checked="" type="checkbox"/> Pt	> 10.0 GeV

Atlantis GUI displays the event data and cuts. The event data is shown as a table with columns for Name and Value. The cuts are shown as a table with columns for Name and Value. The event data table shows a single row with a checked checkbox and the text '| Pt|' in the Name column, and '> 10.0 GeV' in the Value column. The cuts table is empty.

Przypadek #3

$W^+W^- \rightarrow l\nu l\nu$
pomiar kąta



Atlantis GUI

File Preferences Lists Reset Demo Previous Next Help

/home/kciesla/work/outreach/masterclasses/events_krakow/7A.zip/7A_40_186923_66049174_355.xml

Event Data

W	1 2	1 2
B	3 4	3 4

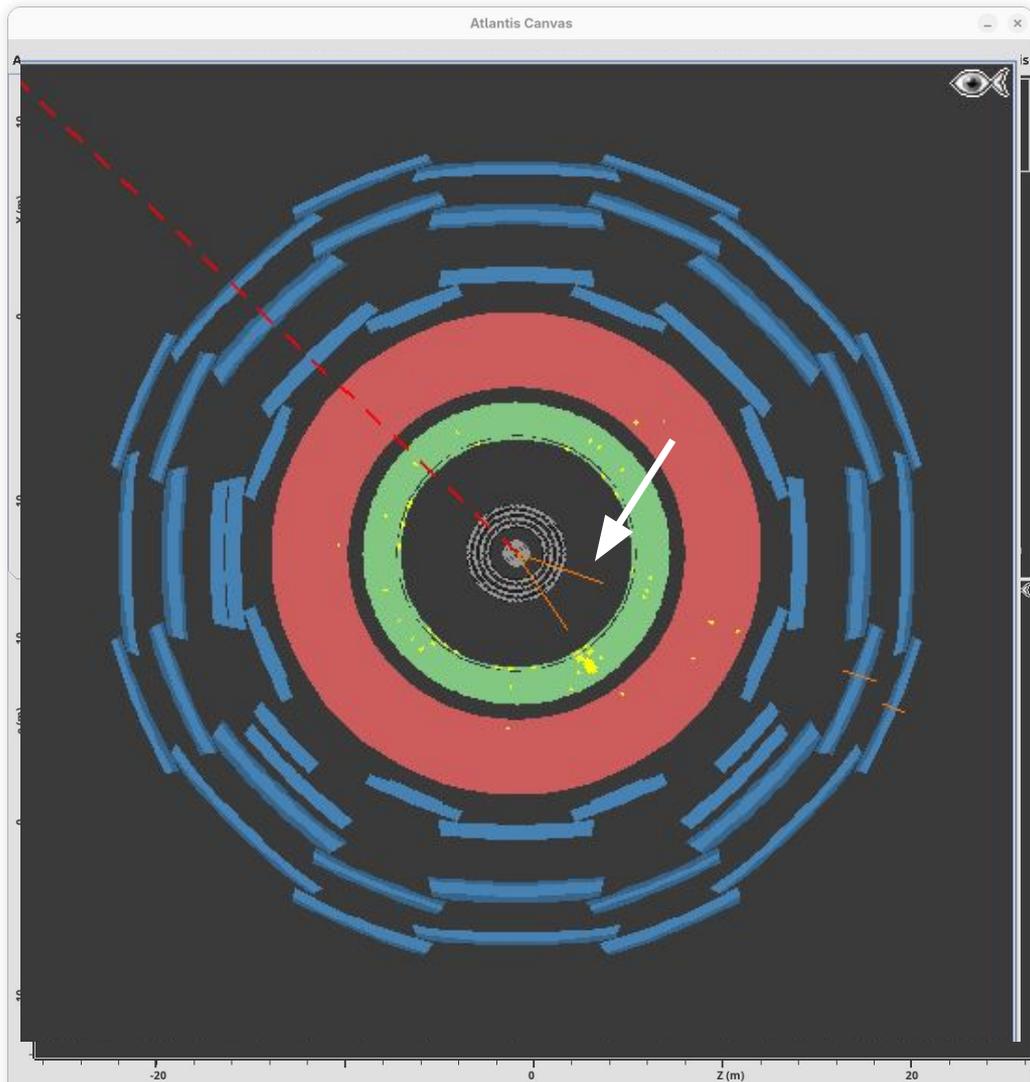
Cuts

InDet	Name	Value
<input checked="" type="checkbox"/>	Pt	> 10.0 GeV

7

Przypadek #3

$W^+W^- \rightarrow l\nu l\nu$
pomiar kąta



Atlantis GUI

File Preferences Lists Reset Demo Previous Next Help

/home/kciesla/work/outreach/masterclasses/events_krakow/7A.zip/7A_40_186923_66049174_355.xml

Event Data

W	1 2	1 2
B	3 4	3 4

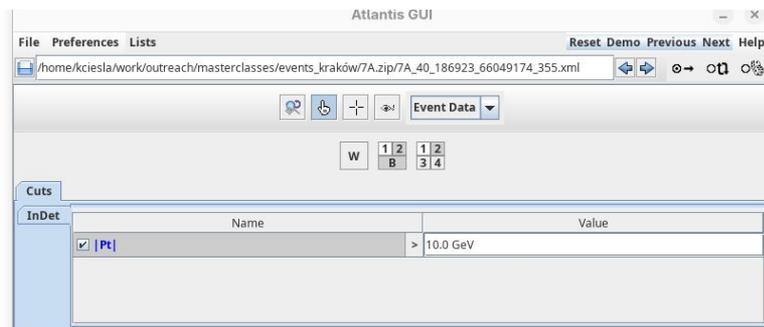
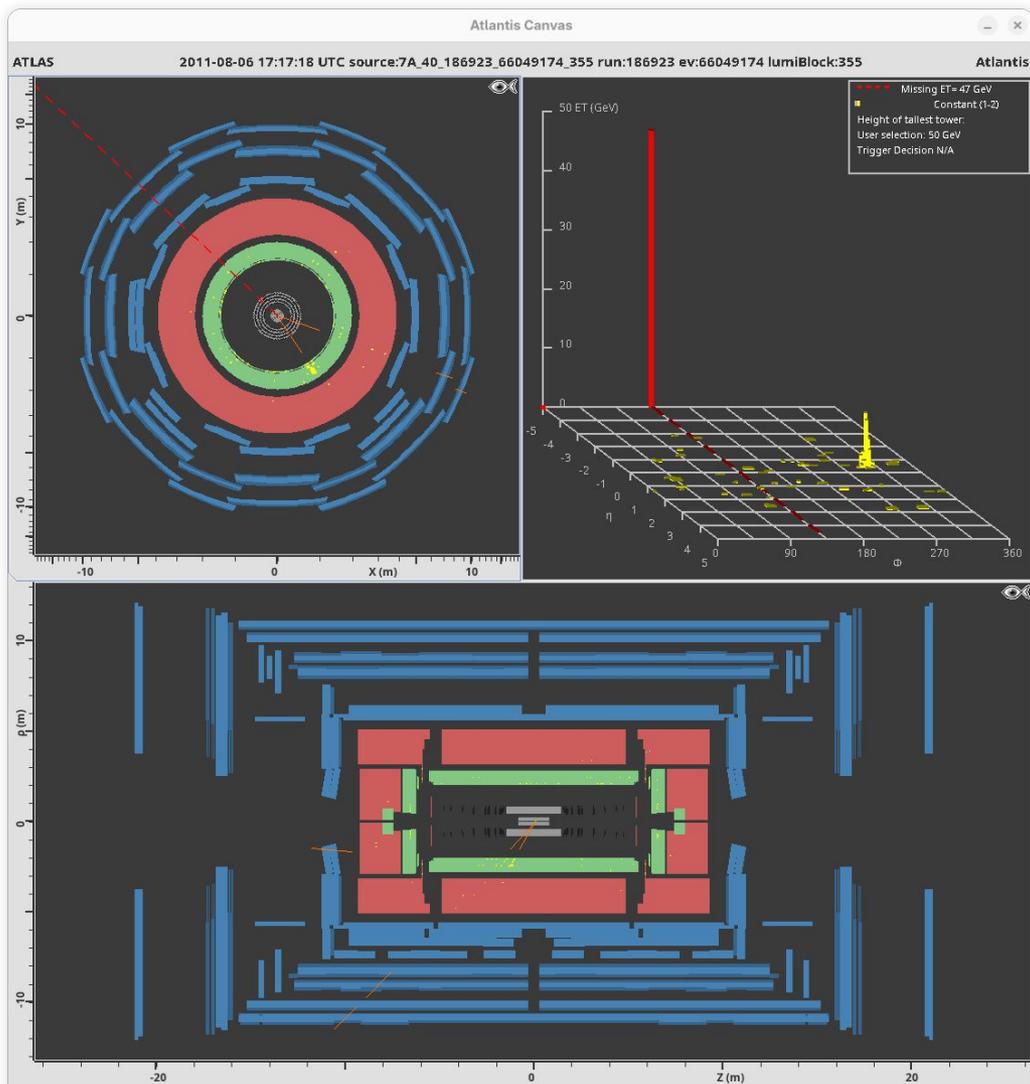
Cuts

InDet	Name	Value
<input checked="" type="checkbox"/>	Pt	> 10.0 GeV

3

Przypadek #3

$W^+W^- \rightarrow l\nu l\nu$
pomiar kąta



$$\Delta\Phi = 39.6^\circ (0.691)$$
$$\Delta R = 0.725$$

Przypadek #3

$W^+W^- \rightarrow l\nu l\nu$
pomiar kąta

ATLAS data analysis

data sample: 5B

event number	signal with 1 lepton (I)				signal with 2 leptons (II)		Back-ground	Comment
	$W \rightarrow \nu + \dots$		$W \rightarrow \nu + \dots$		$WW \rightarrow l^+ \nu l^- \nu$	$\Delta\phi_{ll}$ round off to whole number		
	e^+	e^-	μ^+	μ^-				
1				X				
2							X	
3					X	40		
4								
5								
6								
7								
8								
9								
10								

Przypadek #4

Tłó

ATLAS data analysis

data sample: 5B

event number	signal with 1 lepton (I)				signal with 2 leptons (II)		Back-ground	Comment
	$W \rightarrow \nu + \dots$		$W \rightarrow \nu + \dots$		$WW \rightarrow l^+ \nu l^- \nu$	$\Delta\phi_{ll}$ round off to whole number		
	e^+	e^-	μ^+	μ^-				
1				X				
2							X	
3					X	40		
4							X	
5								
6								
7								
8								
9								
10								

Przypadek #5

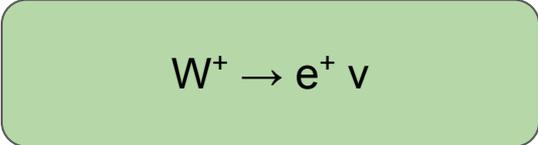
Tłó

ATLAS data analysis

data sample: 5B

event number	signal with 1 lepton (I)				signal with 2 leptons (II)		Back-ground	Comment
	$W \rightarrow \nu + \dots$		$W \rightarrow \nu + \dots$		$WW \rightarrow l^+ \nu l^- \nu$	$\Delta\phi_{ll}$ round off to whole number		
	e^+	e^-	μ^+	μ^-				
1				X				
2							X	
3					X	40		
4							X	
5							X	
6								
7								
8								
9								
10								

Przypadek #6

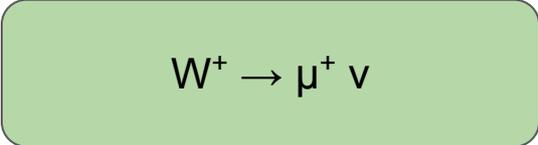


ATLAS data analysis

data sample: 5B

event number	signal with 1 lepton (I)				signal with 2 leptons (II)		Back-ground	Comment
	$W \rightarrow \nu + \dots$		$W \rightarrow \nu + \dots$		$WW \rightarrow l^+ \nu l^- \nu$	$\Delta\phi_{ll}$ round off to whole number		
	e^+	e^-	μ^+	μ^-				
1				X				
2							X	
3					X	40		
4							X	
5							X	
6	X							
7								
8								
9								
10								

Przypadek #7

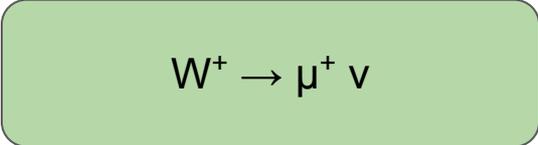


ATLAS data analysis

data sample: 5B

event number	signal with 1 lepton (I)				signal with 2 leptons (II)		Back-ground	Comment
	$W \rightarrow \nu + \dots$		$W \rightarrow \nu + \dots$		$WW \rightarrow l^+ \nu l^- \nu$	$\Delta\phi_{ll}$ round off to whole number		
	e^+	e^-	μ^+	μ^-				
1				X				
2							X	
3					X	40		
4							X	
5							X	
6	X							
7			X					
8								
9								
10								

Przypadek #8



ATLAS data analysis

data sample: 5B

event number	signal with 1 lepton (I)				signal with 2 leptons (II)		Back-ground	Comment
	$W \rightarrow \nu + \dots$		$W \rightarrow \nu + \dots$		$WW \rightarrow l^+ \nu l^- \nu$	$\Delta\phi_{ll}$ round off to whole number		
	e^+	e^-	μ^+	μ^-				
1				X				
2							X	
3					X	40		
4							X	
5							X	
6	X							
7			X					
8			X					
9								
10								

Przypadek #9

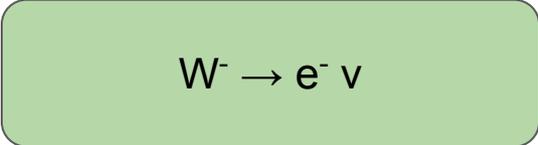
Tłó

ATLAS data analysis

data sample: 5B

event number	signal with 1 lepton (I)				signal with 2 leptons (II)		Back-ground	Comment
	$W \rightarrow \nu + \dots$		$W \rightarrow \nu + \dots$		$WW \rightarrow l^+ \nu l^- \nu$	$\Delta\phi_{ll}$ round off to whole number		
	e^+	e^-	μ^+	μ^-				
1				X				
2							X	
3					X	40		
4							X	
5							X	
6	X							
7			X					
8			X					
9							X	
10								

Przypadek #10... i tak aż do #50



ATLAS data analysis

data sample: 5B

event number	signal with 1 lepton (I)				signal with 2 leptons (II)		Back-ground	Comment
	$W \rightarrow \nu + \dots$		$W \rightarrow \nu + \dots$		$WW \rightarrow l^+ \nu l^- \nu$	$\Delta\phi_{ll}$ round off to whole number		
	e^+	e^-	μ^+	μ^-				
1				X				
2							X	
3					X	40		
4							X	
5							X	
6	X							
7			X					
8			X					
9							X	
10		X						

Dziękuję za uwagę!