

#### Debug tool usage

#### **Getting the tool**

Get the definition#include "DaVinciMCTools/IDebugTool.h"Declare your instanceIDebugTool \*m\_debugGet your instancetoolSvc()->retrieveTool("DebugTool", m\_debug)

#### Using the tool

Event as trees m\_debug->printEventAsTree( mcparts [, assoc] )

Particle decay as tree m\_debug->printTree( part [, depth] )

Event as a flat list m\_debug->printEventAsList( parts [, assoc] )

Ancestors m\_debug->printAncestor( mcpart )

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			Debu	g tool	outpu	t	
<			MCPart:	icle			>
	Name	E	М	Р	Pt	phi	Vz
		GeV	GeV	GeV	GeV	mrad	Cm
BO		29.828	5.279	29.358	7.666	-29.331	-1.780
+>J/psi(1S)		29.119	3.097	28.954	7.707	4.943	-1.450
+>mu+		23.835	0.106	23.835	7.396	69.765	-1.450
+>mu-		5.284	0.106	5.283	0.580	-967.540	-1.450
+>nu_e		0.046	-0.000	0.046	0.041	58.550	1932.276
+>e-		0.039	0.001	0.039	0.038 -	2650.137	1932.276
+>nu_e		0.021	-0.000	0.021	0.017	1996.055	1932.276
+>KSO		0.710	0.498	0.506	0.267 -	1736.262	-1.450
+>pi+		0.280	0.140	0.243	0.167	2955.913	-0.167
+>mu+		0.110	0.106	0.030	0.019 -	1545.998	234.307
+>nu_e		0.017	0.000	0.017	0.007	2418.076	234.307
+>e+		0.036	0.001	0.036	0.030	2629.653	234.307
+>nu_e		0.052	-0.000	0.052	0.037	-554.517	234.307
+>nu_e		0.030	0.000	0.030	0.019	1595.595	234.307
+>pi-		0.429	0.140	0.406	0.317 -	1182.472	-0.167

# Ce la



# Debug tool side by side output

<	MCParticle		;	><	Part	cicle	>
	Name	Р	Pt	5	Name	Р	Pt
		GeV	Gel	Ι		GeV	GeV
BO	29.	358	7.666	No	associated	particle	
+>J/psi(1S)	28.	954	7.707	No	associated	particle	
+>mu+	23.	835	7.396	No	associated	particle	
+>mu-	5.	283	0.580	mu-	Ę	5.272	0.578
+>nu_e	0.	046	0.041	No	associated	particle	
+>e-	0.	039	0.038	No	associated	particle	
+>nu_e	0.	021	0.017	No	associated	particle	
+>KSO	0.	506	0.267	No	associated	particle	
+>pi+	0.	243	0.167	No	associated	particle	
+>mu+	0.	030	0.019	No	associated	particle	
+>nu_e	0.	017	0.007	No	associated	particle	
+>e+	0.	036	0.030	No	associated	particle	
+>nu_e	0.	052	0.037	No	associated	particle	
+>nu_e	0.	030	0.019	No	associated	particle	
+>pi-	0	406	0.317	No	associated	particle	

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# **Debug tool List and Ancestors output**

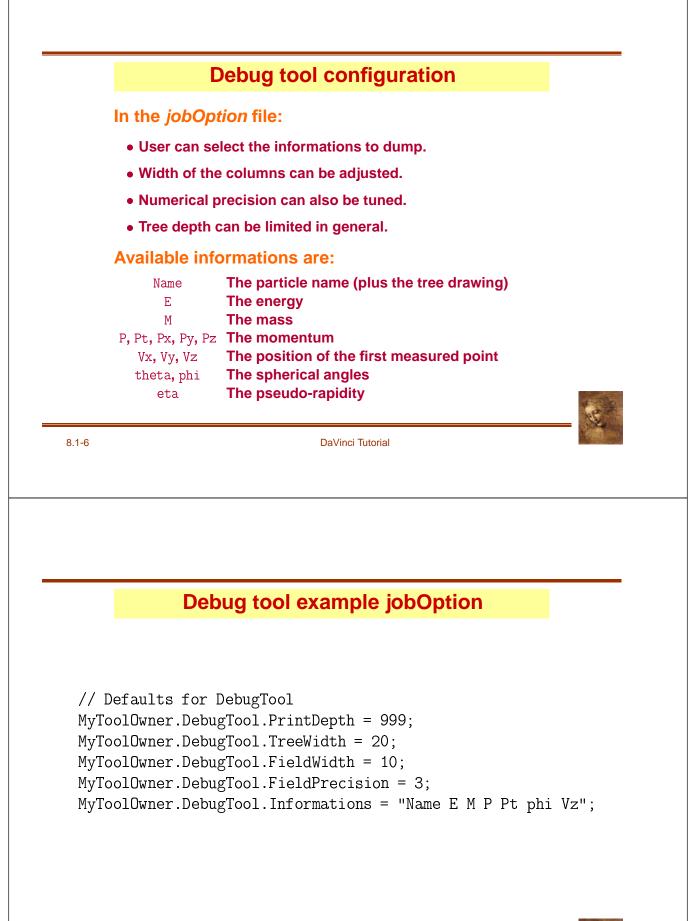
#### Flat list

<	Partic	le		>
Ν	lame	Vz	Vz	Vz
		CM	cm	CM
pi+	0.6	45 0.8	537 (	64.9
pi-	0.3	85 -0.7	729 2	28.9
e-	-0.7	35 7	7.2	484
pi+	0.3	93 0.7	728 2	28.9
mu-	5.	97 15	5.5	487
pi+	6.	01 15	5.2	488
pi-	-0.2	.93 0.8	399	15.4
e-	-3.	85 -6	.23	232
mu-	0.6	64 -0.8	354 .	7.93
gamma	-2	05 -2	295 1.26	e+03

#### **Ancestors**

piO -> gamma -> e+









# 8.2 (MC)DecayFinder

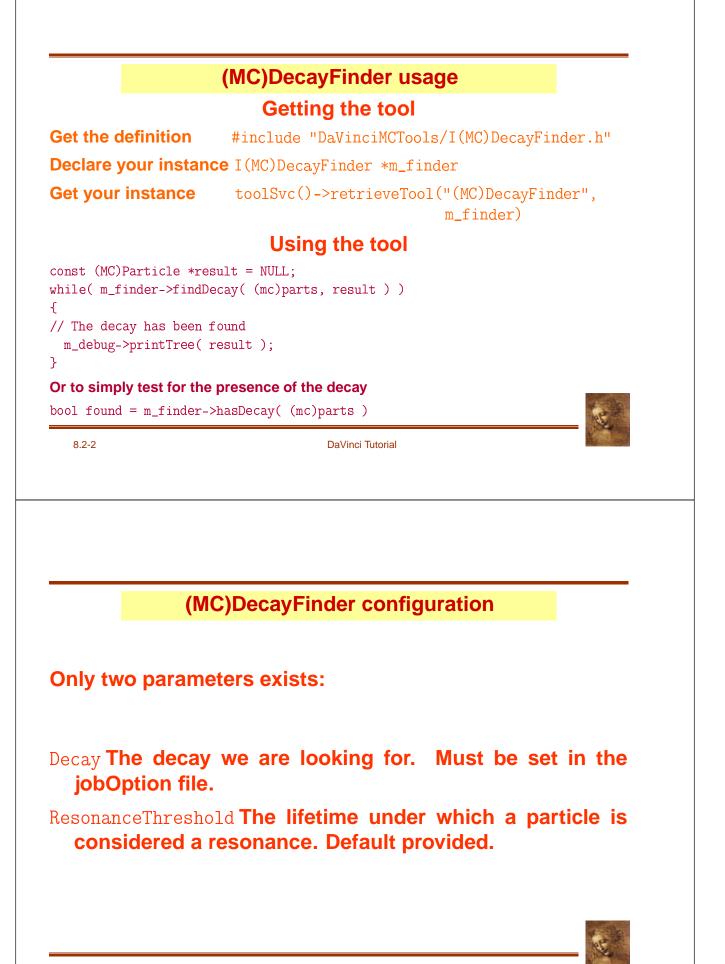


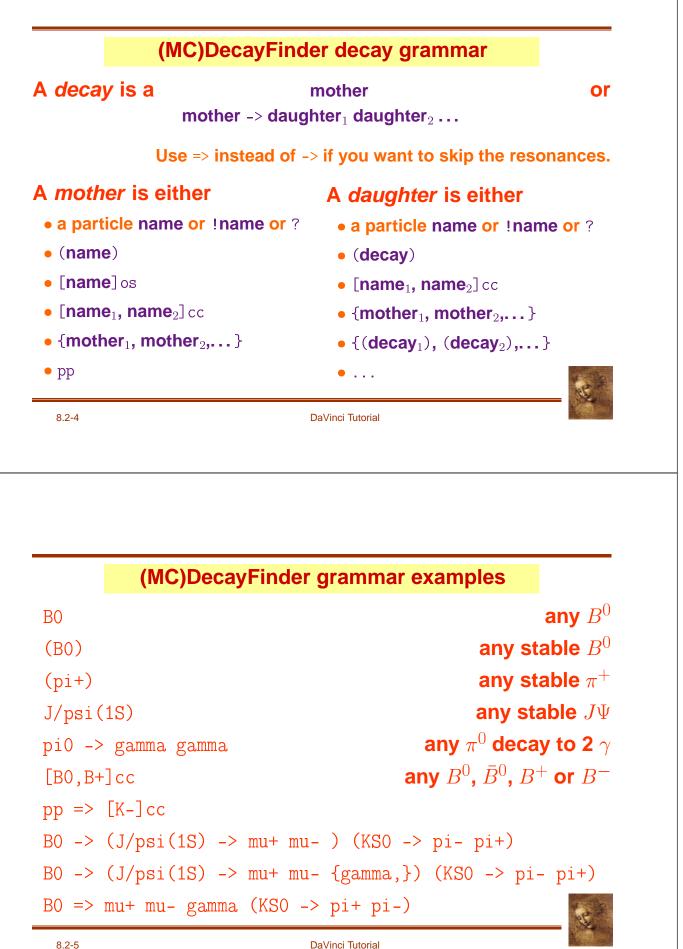
### (MC)DecayFinder

Goal: Find any inclusive or exclusive decay in an event

- Work at the particle ID level.
- Work on both reconstructed and MC data.
- Find multiple instances of the decay.
- Use a simple description of the decay.









# 8.3 Gaudi utilities: a reminder



To print out informations use the *MessageService* and not cout. Because:

- It works like cout.
- It adds a severity tag to your message.
- It tells the user from where the message is coming.
- It can be filtered based on severity.



	Printing How-To
	nition of this facility. AudiKernel/MsgStream.h"
Create a stre	Ŭ
	g(msgSvc(), name())
• Print!	,6 (m. 6,6 ( ) ; mamo ( ) )
	<pre>DEBUG &lt;&lt; "Hello World!" &lt;&lt; endreq</pre>
0	
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	Severity & Notes
he available s	Severity & Notes
The available s • MSG::DEBUG • MSG::INFO	
• MSG: :DEBUG	
• MSG::DEBUG • MSG::INFO	
<ul> <li>MSG::DEBUG</li> <li>MSG::INFO</li> <li>MSG::WARNING</li> </ul>	
<ul> <li>MSG::DEBUG</li> <li>MSG::INFO</li> <li>MSG::WARNING</li> <li>MSG::ERROR</li> <li>MSG::FATAL</li> </ul>	everity levels are (in increasing order):
<ul> <li>MSG::DEBUG</li> <li>MSG::INFO</li> <li>MSG::WARNING</li> <li>MSG::ERROR</li> <li>MSG::FATAL</li> </ul>	everity levels are (in increasing order): the Message Service can be split. You just
<ul> <li>MSG::DEBUG</li> <li>MSG::INFO</li> <li>MSG::WARNING</li> <li>MSG::ERROR</li> <li>MSG::FATAL</li> </ul>	everity levels are (in increasing order):

#### Ntuple

#### To use a Ntuple you have to

- **1. Declare the variables of your ntuple.**
- 2. Create the ntuple.
- **3. Register the ntuple.**
- 4. Register your variables to your ntuple.
- 5. Fill the variables & commit.
- 6. Adjust the NtupleSvc.Output in your jobOption file.

Note that step 2. could fail if the ntuple already exists.

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**Ntuple variables declaration** 

First get the definition of what kind of items can be put in the ntuple.

#include "GaudiKernel/NTupleItems.h"

Than declare your variables with the appropriate type.

NTuple::Item<long> m\_nPart; NTuple::Array<float> m\_px, m\_py, m\_pz; NTuple::Matrix<float> m\_trackEnds\_x, m\_trackEnds\_y, m\_trackEnds\_z;

Array and Matrix can only be used with a column wise ntuple.



### Ntuple creation & booking

# 

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### **Ntuple setup**

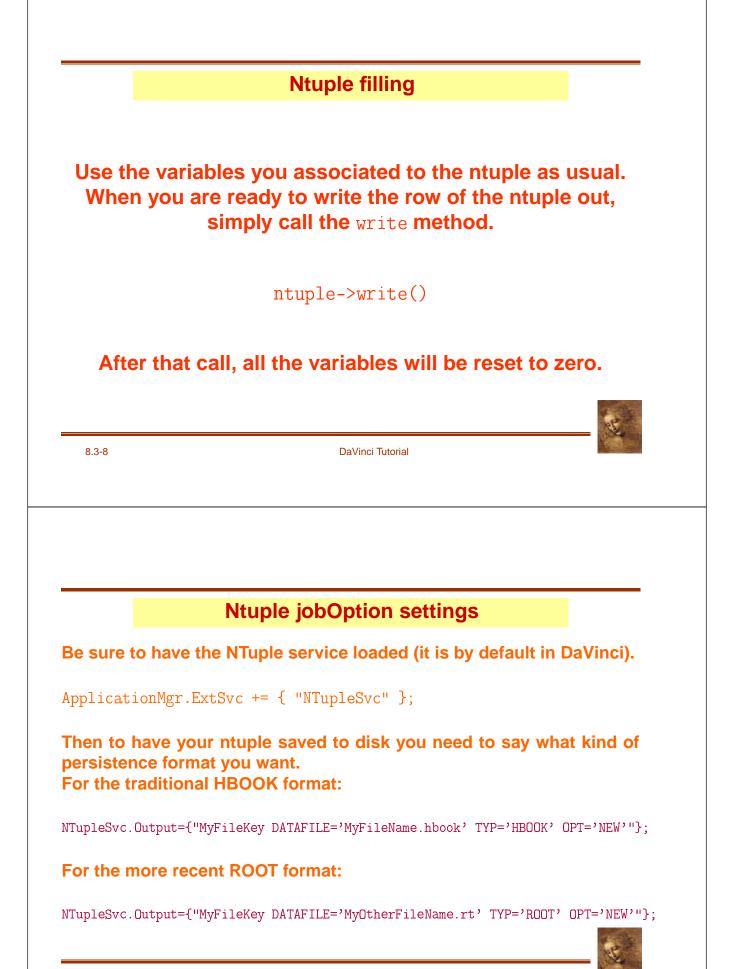
### Attach the variables to the ntuple.

```
status = nt->addItem ("NParts", m_nPart, 0, 5000);
if( status.isSuccess() )
  status = nt->addIndexedItem ("px", m_nPart, m_px);
if( status.isSuccess() )
  status = nt->addIndexedItem ("vx", m_nPart, 2, m_trackEnds_x);
...
```

### Or if it already exists, reattach the variables.

```
status = nt->item ("NParts", m_nPart);
if( status.isSuccess() ) status = nt->item ("px", m_px);
if( status.isSuccess() ) status = nt->item ("vx", m_trackEnds_x);
...
```





	Histogram
To use the histogra	m facility you have to
1. Select the kind of	<sup>f</sup> persistence you want (Hbook or Root)
2. Adjust the jobOp	tion file.
3. Create & register	your histograms.
4. Fill them.	
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0.0 10	
	istogram persistence
H Histogram persister or Root.	istogram persistence nce can be achieved with either Hbook
H Histogram persister or Root.	istogram persistence nce can be achieved with either Hbook ult of Hbook to Root you must change
H Histogram persister or Root. To change the defa	istogram persistence nce can be achieved with either Hbook ult of Hbook to Root you must change
H Histogram persister or Root. To change the defar the requirement file	istogram persistence nce can be achieved with either Hbook ult of Hbook to Root you must change of DaVinci to
H Histogram persister or Root. To change the defar the requirement file #use HbookCnv use RootHistCnv	istogram persistence nce can be achieved with either Hbook ult of Hbook to Root you must change of DaVinci to v12r0
H Histogram persister or Root. To change the defar the requirement file #use HbookCnv use RootHistCnv You also need to ch \\#include "\$STDOPTS/HR \\HistogramPersistency #include "\$STDOPTS/Root	<pre>istogram persistence nce can be achieved with either Hbook ult of Hbook to Root you must change of DaVinci to     v12r0     v6r0 ange the jobOption file to book.opts" Svc.OutputFile = "Histos.hbook";</pre>

#### Histogram creation

#### Get the headers defining the histograms.

#include "GaudiKernel/IHistogramSvc.h"
#include "AIDA/IHistogram1D.h"

#### Declare the variable which will contain your histogram.

IHistogram1D \*m\_hBOMass

#### Create and book your histogram.

if( 0 == m\_hBOMass) BUG();

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**Histogram filling** 

Histogram filling is straightforward.

m\_hBOMass->fill(candB0.mass()/GeV, 1.)

Always divide the value by the unit so you don't have to remember the default units.