On TUNE and ITUNE programmes

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Setting for πE3

P = 28. MeV/c   Particle : μ^+ Mode : Example

Elements	B [KG]	I [A]	DAC	$\frac{\mathrm{I}}{\mathrm{Imax}} \cdot \frac{100}{D\mathrm{r}}$	r Range factor	Imax [A]
QTD 71	0.5642	35.76	1464	0.358	20	500
QTD 72	-0.3669	-23.21	-950	0.232	20	500
QTB 71	0.1195	7.47	306	0.075	20	500
ASK 71	1.5994	59.34	486	0.119	100	500
HSA 71	0.0966	1.37	56	0.027	100	50**
QSK 71	0.4951	27.35	448	0.109	100	250
QSK 72	0.022	0.83	68	0.017	20	250
QSK 73	-0.5577	-30.85	-1263	0.309	20	500
QSK 74	0.6221	34.46	1411	0.345	20	500
HSD 72	-0.2016	-18.12	-371	0.091	100	200*
ASK 72	1.5017	55.68	456	0.111	100	500
HSD 71	-0.3828	-33.67	-689	0.168	100	200
QSB 71	0.257	14.49	593	0.145	20	500
QSB 72	-0.081	-4.57	-187	0.046	20	500
SEP 71	1.	0.1	4	0.002	100	50
QSB 73	-0.6187	-34.91	-1429	0.349	20	500
QSB 74	0.7058	39.83	1631	0.797	100	50**

Example for QTD 71 : $\frac{\mathrm{I}}{\mathrm{Imax}} \frac{100}{\mathrm{r}} = \frac{35.76}{500} \times \frac{100}{20} = 0.358$

$\frac{35.76}{500} \times \frac{100}{20} = 0.3576 \rightarrow \mathrm{DAC} = 0.3576 \times 4095 = 1464$

* : HSA72 is the name of its power supply   **2048 instead of 4095 !!

1

1 Introduction

This is an introduction to **5** programmes :

- **Tune**
- **Itune**
- **b_to_Dac**
- **Dac_toB**
- **Element**

In fact **Tune** and **Itune** consist of many programmes (6 to 7) !!

Tune allows to get DAC values from a file à la TURTLE.

Itune allows to obtain field values from DAC ones, as obtain during a tunning of the beam.

b_to_Dac and **Dac_toB** do the same for individual magnetic element.

Element gives you exitation curve together with other informations on the element (it use the graphic package GRAPHX)

All these programmes use the measured exitation curve to make the convertion from DAC to B or the other way arround.

They are written in Fortran90 and run on PSICLC only[1]

Tune and **Itune** produced a LAT_EX file, and **b_to_Dac**, **Dac_toB** a .DOT one.

The separator are treated in a special way. For πm3 and πm1 the value of the DAC for electric high voltage and current (for the later) are given instead of the effective length; for πe3 it is the value of the curent. For all instead of the radius of the aperture, the DAC value corresponding to the applied magnetic filed in given !!

[1]For the moment 1997

2 ITUNE programme

This programme convert from **DAC** values to **FIELD** values.

To run it type : **r**un DISK_117_SRC0:[FEREYDOUN.SETTING]ITUNE

You will obtain a menu :

1 .... πM1
2 .... πM3-GPS
3 .... πM3-LTF
4 .... πE1
5 .... πE3
6 .... πE5-U
7 .... πE5-Z
8 .... μE1
9 .... μE4
E .... Exit

- Choose the corresponding number[2]. Then you get :

  We are setting for πE3

  what is the mometum [Mev/c] ?

- Give the momentum, the programme ask you :

  A return terminate the programme

  Gives the DAC value for QTH51 [integer]

- enter the corresponding value, next :

  Was a rang factor of 20% for QTH51 [y/] ?

- Here if the answer is yes type : y or Y, otherwise type return

- when you have finished (either by typing a return or because you are at the end of the beam line) the programme asks :

  Do you want to change all sign (+ to −) or (− to +) [y/] ?

[2]Say number 5

- Next :

  Which particle [pi+,pi−,mu+,mu−] ?

- then

Which mode

- Here the format are those for $\LaTeX$, so you can answer for example : `{\bf Achromatic}`

Next

Do you want file a la TRANSPORT for this setting [y/] ?

- If your answer is yes then you will be asked for the name of the corresponding file. I recommend to do this , so for a future use of this setting you can run the **TUNE** programme. It allows also to run TRANSPORT in order to have an idea of what your setting really is.

- Next :
  Which of the following printer are you using ?

1 .... PSW04 (PS file)
2 .... PSW02 (PS file)
3 .... PSW01 (PS file)
4 .... PSW10 (PS file)
E .... Exit

Enter your choice :

- If you don't know which printer answer E (or e) then you have a **SETING.PS** where you are working.

2.1 Example

Below is an examples of a file produced by **ITUNE** programme for πE3 beam line, and for μ of 28 Mec/c. In fact the name is PIE3_MORENZONI.TRA

```
/-Pie3 normal/
 0
 1. .15 40.0 .5 60.0 .0 .1 .028 /BEAM/ ;
 5.0 .474 +.56423 12.0 /QTD1/ ;
 5.0 .474 -0.3669 12.0 /QTD2/ ;
 5.0 .474 +.11945 12.0 /QTB1/ ;
 4.0 .700 +1.5994 0.00 /ASK1/ ;
 18. .300 +.09659 16.0 /HSA1/ ;
 5.0 .390 +0.4951 12.5 /QSK1/ ;
 5.0 .390 +.02196 12.5 /QSK2/ ;
 5.0 .390 -.55771 12.5 /QSK3/ ;
 5.0 .390 +.62208 12.5 /QSK4/ ;
 18. .300 -.20158 16.0 /HSD2/ ;
 4.0 .700 1.50170 0.00 /ASK2/ ;
 18. .300 -.38283 16.0 /HSD1/ ;
 5.0 .314 +.25702 12.9 /QSB1/ ;
 5.0 .314 -.08104 12.9 /QSB2/ ;
 21. +1.0 +0.1000 44.0  /SEP1/ ;
 5.0 .314 -.61873 12.9 /QSB3/ ;
 5.0 .314 +.70579 12.9 /QSB4/ ;
 3. .726 /TAR/ ;
 SENTINEL
```

In the next page is the corresponding **SETING.PS**

Setting for πE3

$P = 28.$ MeV/c Particle : μ^+ Mode : Example

Elements	B [KG]	I [A]	DAC	$\frac{\mathrm{I}}{\mathrm{Imax}} \cdot \frac{100}{Dr}$	r Range factor	Imax [A]
QTD 71	0.5642	35.76	1464	0.358	20	500
QTD 72	-0.3669	-23.21	-950	0.232	20	500
QTB 71	0.1195	7.47	306	0.075	20	500
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QSK 73	-0.5577	-30.85	-1263	0.309	20	500
QSK 74	0.6221	34.46	1411	0.345	20	500
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SEP 71	1.	0.1	4	0.002	100	50
QSB 73	-0.6187	-34.91	-1429	0.349	20	500
QSB 74	0.7058	39.83	1631	0.797	100	50**

Example for QTD 71 : $\frac{\mathrm{I}}{\mathrm{Imax}} \frac{100}{\mathrm{r}} = \frac{35.76}{500} \times \frac{100}{20} = 0.358$

$\frac{35.76}{500} \times \frac{100}{20} = 0.3576 \rightarrow \mathrm{DAC} = 0.3576 \times 4095 = 1464$

* : HSA72 is the name of its power supply **2048 instead of 4095 !!

3 TUNE programme

This programme convert from **FIELD** values to **DAC** values and produce a nice $\LaTeX$ style output.

This programme need to read in a file **à la TRANSPORT** or a simplified version of it (see the example)

The magnetic components must have their name characterized by **three uppercase** letters (for example QTH or ASK) , the number of beam line , and possibly a number to identify their position in the beam line.

This file might be one you are using to set up your optic (with TRANSPORT or TURTLE) or correspond to an old (but good) setting !

The corresponding number for beam line and the name of the beam line is

1 .... πM1
2 .... πM3-GPS
3 .... πM3-LTF
4 .... πE1
5 .... πE3
6 .... πE5-U
7 .... πE5-Z
8 .... μE1
9 .... μE4

Enter your choice :

For example for the πE3 beam line and the first element ASK we have :
ASK71

To run it type : **r**un DISK_117_SRC0:[FEREYDOUN.SETTING]TUNE

You will obtain a menu :

1 .... πM1
2 .... πM3-GPS
3 .... πM3-LTF
4 .... πE1
5 .... πE3
6 .... πE5-U
7 .... πE5-Z
8 .... μE1
9 .... μE4
E .... Exit

- Choose the corresponding number[3]. Then you get :

  We are setting for πE3

- next :

  What is the name of the file with the setting
  (A return terminate the session) ?

- enter the corresponding name (for example PIE3_MORENZONI.TRA)
- the programme says

  For this beam line there is an automatic range-factor
  of 20% for the QUADRUPOLES
  (it is effective when I/Imax < 0.10)

- next :

  Do you want to change all sign (+ to −) or (− to +) [y/] ?

- If you answer is yes , type y , or Y

- Next :

  Which particle [pi+,pi−,mu+,mu−] ?

[3] Say number 5

- Then

  Which mode

- Here the format are those for LaTeX, so you can answer for example : `{\bf Achromatic}`

- Next :

  Which of the following printer are you using ?

  1 .... PSW04 (PS file)
  2 .... PSW02 (PS file)
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  Enter your choice :

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3.1 Example

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 5.0 .314 +.70579 12.9 /QSB4/ ;
 3. .726 /TAR/ ;
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```

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$P\ =\ 28.$ MeV/c Particle : μ^{+} Mode : Example

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* : HSA72 is the name of its power supply **2048 instead of 4095 !!

4 DAC_TO_B programme

If you just want the conversion from DAC to FIELD for a few number of elements you can run the DAC_TO_B programme :

To run it type : **r**un DISK_117_SRC0:[FEREYDOUN.SETTING]DAC_TO_B

- The programme asks :

  Which element

  Give the type and the identification number

  (for example QTD71). An E or an e terminate the programme.

  Enter the element :

- you enter for example QTD71, next :

  What is the wanted DAC for the magnetic field of QTD71 ?

- enter for example 1052, next :

  Was a range factor of 20% for this quadrupole [y/] ?

- If the answer is yes type y or Y, otherwise type return

  For the element QTD 71 the wanted

B	I	DAC	range-factor	are :
KG	A			
2.8940	183.3944	1502	100	

- When you have finished :

  The results are in DAC_TO_B.**DOT** file.

5 B_TO_DAC programme

If you just want the conversion from FIELD to DAC for a few number of elements you can run the B_TO_DAC programme :

To run it type : **r**un DISK_117_SRC0:[FEREYDOUN.SETTING]B_TO_DAC

- The programme asks :

  For which element ?

  Give the type and the identification number

  (for example QTD71). An E or an e terminate the programme.

  Enter the element :

- you enter for example QTD71, next :

  What is the wanted FIELD in [KG] for QTD71 ?

- enter for example 2.21, next :

  For this beam line there is an automatic range-factor
  of 20% for the QUADRUPOLES
  (it is effective when I/Imax < 0.10)

  For the element QTD 71 the wanted

B	I	DAC	range-factor	are :
KG	A			
2.21	140.6849	1152	100	

- When you have finished :

  The results are in B_TO_DAC.**DOT** file.

6 ELEMENT programme

With this programme you obtain the **exitation** curve for a given magnet in a **given** beam line, for example : ASK71 or QSE33.

In the margin of the plot you have the corresponding :

- L_{eff} : the effective length
- ρ : The radius of the circle tangent to the pole tips (Gap for a dipole)
- I_{max} : the maximum current of the power suply for magnetic field
- DAC_{max} : The maximum DAC value (4095 or 2948)

and this for each specific element !

In the lower right corner you get the formula for a **linear** fit.

<u>To run it type :</u> **r**un DISK_117_SRC0:[FEREYDOUN.SETTING]ELEMENT

- The programme asks :

  For which element ?

  Give the type and the identification number

  (for example ASK71). An E or an e terminate the programme.

  Enter the element :

- you enter for example ASK71

The programme then plot the corresponding exitation curve.
In the top of the plot you will have a menu in yellow color with a cursor

Do you want a PS ?
N   Y

If you want a postscript **click** it the box with Y, oterwise click in the box with N. If your choice was yes, then the graphics package ask for the name of the postscript file.

See an example in the next page.

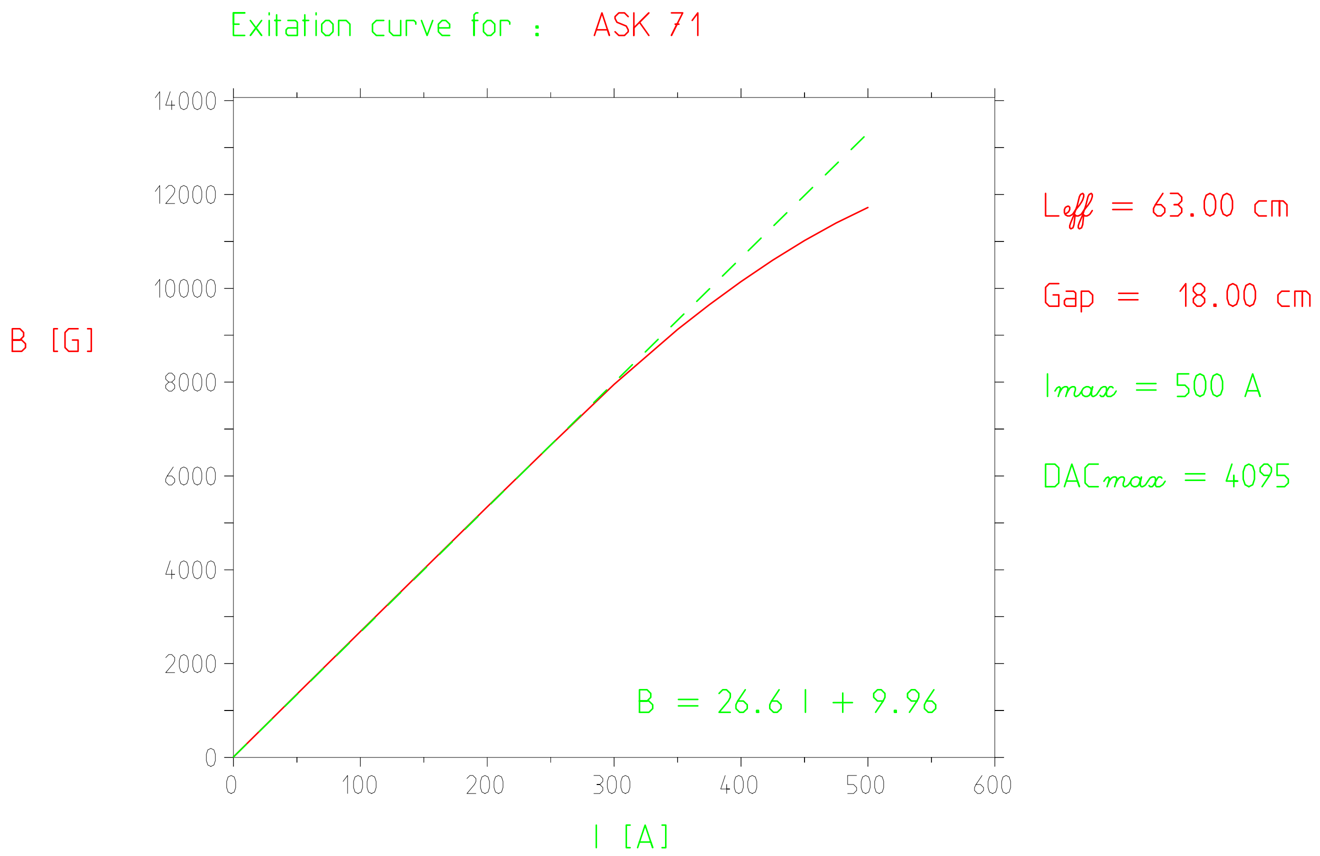

Figure 1: Example of output from ELEMENT programme

7 Introduction to the graphics package GRAPHX

Here is the way to proceed :

- type : import graphx
- type : define gracli
- answer : old

In this way you have imported the graphics package and have a convenient windowing.

If you want postscripts **not** to be included in a LaTeX file then :

- type : gracon
- Choose the code corresponding to your terminal (for example 1 for X-terminal)
- type : L
- type : 1
- type : M
- type : 3
- give a name, in fact it does not matter which one !!
- type : return to terminate the session

In this way you will have all your plot in one PS (3 under M) in PORTRAIT format.

If under M you answer : 4, then each postscript will be in a different file, this is convenient if you want to include them in a LaTeX file !!