

Update
v.9.10.119
from 06/23/15

Please find the first part of
Optics minimization v.9.10.100 :
http://lise.nsci.msu.edu/9_10/9_10_minimization.pdf

1. Fitting constraint block : new option “Active”
2. Change the Fitting option "Active" in the “Fast Edit Optics” dialog
3. New Option in the Preferences dialog: show "Fit" blocks in the Scheme and Setup windows
4. Appearance of Fitting constraint blocks in Menus, Dialog, Windows
5. Call the "Fast Edit Optics" dialog from the Optics optimization dialog
6. User Break in the Minimization process
7. Miscellaneous for fitting procedure
8. Miscellaneous for v.9.10.119

New option

The dialog box 'Fit 1' contains the following sections:

- Constraint Status:** A checkbox labeled 'This constraint is ACTIVE (will be used in the minimization process)' is checked. A pink arrow points to this checkbox from the text 'New option'.
- Desired parameters of element to fit:**
 - Constraint: Equal to (dropdown)
 - Desired Value = 0
 - Desired Accuracy = 0.001
 - Constraint name = Fit 1
 - TRANSPORT notation: 10.0 -1. 2. 0 0.001 "Fit 1"
 - Typical TRANSPORT constraints button
- Select Element to Fit:**
 - Global Block matrix table:

	X	T	Y	F	L	D	
1. X	2.3257	0.0106	0	0	0	0	-59.0407
2. T	-1.0593	0.4252	0	0	0	0	0.1935
3. Y	0	0	0.9969	0.0336	0	0	0
4. F	0	0	6.3831	1.2182	0	0	0
5. L	6.2085	-2.5106	0	0	1	0	-5.455
6. D	0	0	0	0	0	0	1
	/[mm]	/[mrad]	/[mm]	/[mrad]	/[mm]	/[%]	

Det = 1.00007
- Beam (sigmas):**
 - 59.0866 [mm]
 - 4.3866 [mrad]
 - 1.052 [mm]
 - 13.7534 [mrad]
 - 26.4312 [mm]
 - 1 [%]
- Dimension:**
 - mm (selected)
 - cm
- Buttons:** OK, Cancel, Help

- If it is not “active”, then the block will still enable in the Setup and FastEditOptics dialogs, but it won’t be shown in The Scheme and Setup windows
- This property it can be easily changed from the “Fast Edit Optics” dialog (see the next slide)

Application for Fitting constraint blocks

Optics settings (fast editing)

Block	Given Name	Start(m)	Length(m)	B0(kG)	Br(Tm)cor/*real	DriftM/*Angle	Rapp(cm)/*R(...)	Leff(m)/*Ldip(m)	2nd order	CalcMatr/*Z-Q	AngAccApps,Slits	COSYIFit	SE
F	Fit	Fit 7	16.385	0.0000							-- -- --	s1 < 150	e
F	Fit	Fit 8	16.385	0.0000							-- -- --	s3 < 150	e
d	drift	DR37	16.385	0.1584		standard					-- -- --	-	e
Q	<Quad>	SC_Q36	16.543	0.3782	+4.2659	1.0000	MULT	15.0000	0.3782	yes	1 R	-- HV --	FIT e
F	Fit	Fit 9	16.921	0.0000							-- -- --	s1 < 150	e
F	Fit	Fit 10	16.921	0.0000							-- -- --	s3 < 150	e
d	drift	DR38	16.921	0.6854		standard					-- -- --	-	e
E	=ElecDip	ElecDip 1	17.607	1.5359	0.0kV	1.0051	* -22.0	* 4.0000	* 1.5359	yes	* 1 R	-- H- --	- E
d	drift	DR41	19.143	0.6853		standard					-- -- --	-	e
Q	<Quad>	SC_Q41	19.828	0.3782	+3.0592	1.0051	MULT	15.0000	0.3782	yes	1 R	-- HV --	FIT e
F	Fit	Fit 11	20.206	0.0000							-- -- --	s1 < 150	e
F	Fit	Fit 12	20.206	0.0000							-- -- --	s3 < 150	e
d	drift	DR42	20.206	0.1584		standard					-- -- --	-	e
Q	<Quad>	SC_Q42	20.365	0.3782	-6.2604	1.0051	MULT	15.0000	0.3782	yes	1 R	-- HV --	FIT e
F	Fit	Fit 13	20.743	0.0000							-- -- --	s1 < 150	e
F	Fit	Fit 14	20.743	0.0000							-- -- --	s3 < 150	e
d	drift	DR43	20.743	0.1584		standard					-- -- --	-	e
Q	<Quad>	SC_Q43	20.901	0.3782	+4.6019	1.0051	MULT	15.0000	0.3782	yes	1 R	-- HV --	FIT e
d	drift	DR44	21.279	0.5634		standard					-- -- --	-	e
F	Fit	foc3 x	21.849	0.0000							-- -- --	R12 = 0	e
F	Fit	foc3 y	21.849	0.0000							-- -- --	// R34 = 0	no
S	_slits_	F3	21.849	0.0000		SLITS					-- -- --	-	e
d	drift	DR45	21.849	0.6894		standard					-- -- --	-	e

Selected block: Fitting constraints

Block name: foc3 y

Block Length [m]: 0

Length after this block [m]: 21.8487

Use in the FIT process ☐

Angular acceptance (mrad): Horizontal ☐ Vertical ☐

Inside Aperture (mm): X = -50 50 Y = -50 50

Slits (mm) after this BLOCK: X = Y =

1-st order Matrix Elements: Matrix Plot Beam-Sigma Plot View

Optics settings (fast editing)

Block	Given Name	Start(m)	Length(m)	B0(kG)	Br(Tm)cor/*real	DriftM/*Angle	Rapp(cm)/*R(...)	Leff(m)/*Ldip(m)	2nd order	CalcMatr/*Z-Q	AngAccApps,Slits	COSYIFit	SE
d	drift	DR44	21.279	0.5634		standard					-- -- --	-	e
F	Fit	foc3 x	21.849	0.0000							-- -- --	R12 = 0	e
F	Fit	foc3 y	21.849	0.0000							-- -- --	R34 = 0	e
S	_slits_	F3	21.849	0.0000		SLITS					-- -- --	-	e
d	drift	DR45	21.849	0.6894		standard					-- -- --	-	e

Selected block: Fitting constraints

Block name: foc3 y

Block Length [m]: 0

Length after this block [m]: 21.8487

Use in the FIT process ☒

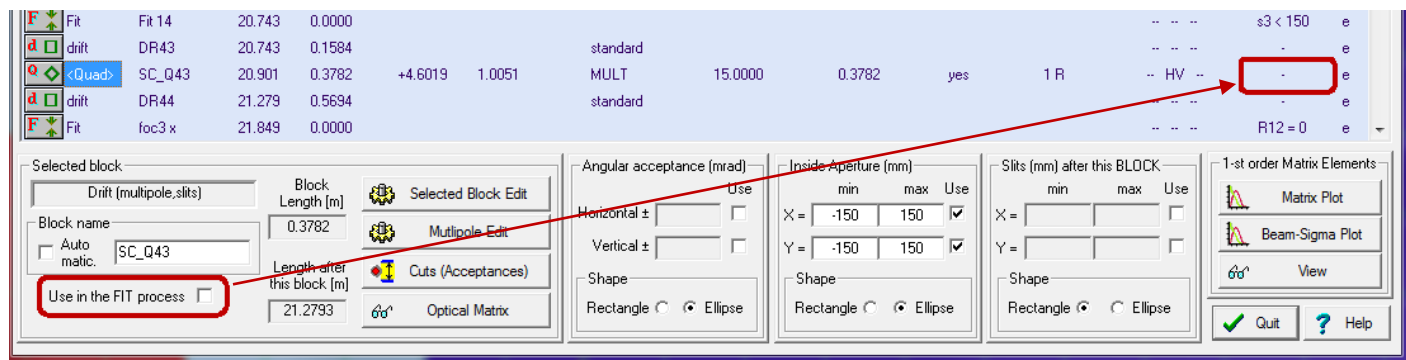
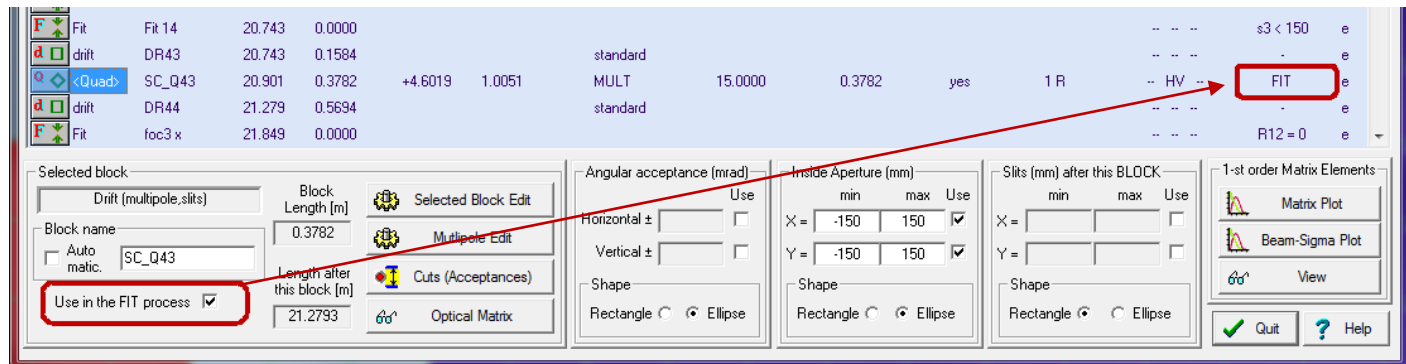
Angular acceptance (mrad): Horizontal ☐ Vertical ☐

Inside Aperture (mm): X = -50 50 Y = -50 50

Slits (mm) after this BLOCK: X = Y =

1-st order Matrix Elements: Matrix Plot Beam-Sigma Plot View

Application for M & E quadrupoles blocks



Preferences

Starting files and working directories

Starting configuration at loading the program: A1900_2015.lcn Browse

Starting options file at loading the program: A1900_2015.lopt Browse

Working directory

Current user has administrative privileges: ☒ Yes

LISE++ working directory (options, config, etc) is: ☐ User \ My Documents ☒ LISE++ root directory

Options dialogs

Calculation settings

Calculation threshold = 1.0e-10 pps

Dimension of distribution (NP)

		recommended
calculation WITHOUT charge states	64	64
calculation WITH charge states	32	32
wedge calculation	32	16

Calculate spectrometer settings using

maximal ☒ mean ☐

value of the momentum distribution

left peak ☐ right peak ☐

Charge States Calculation

No ☒ Yes ☐

Apply the "Edge" effect in distribution cuts

☒ Yes (default) ☐ No (recommended for extended configurations)

Cross Section

Fit ☐ File ☒ CS File Settings

Transmission information in the Table of Nuclides

Display 1: Total: All reactions (pps)

Display 2: Total ion transmission (%)

☐ Make default

☒ Show Fitting constraint blocks in the Setup and Scheme windows

☒ Navigation map

☒ Spectrometer scheme

☐ Sound

☐ 3D-Balls Animation

☐ Show transmission calculation time

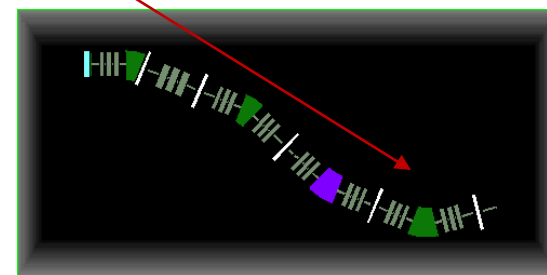
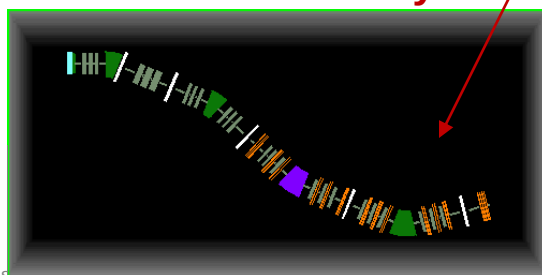
☐ Charge State Optimization Debugging Mode

☐ Distribution Debugging Mode (file 'distrib.txt')

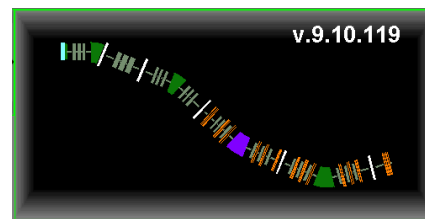
☐ Check LIZ-file consistency (Configurations)

☐ Check LIZ-file consistency (Options)

☐ Hold angles of an inclination of a target and a stripper together



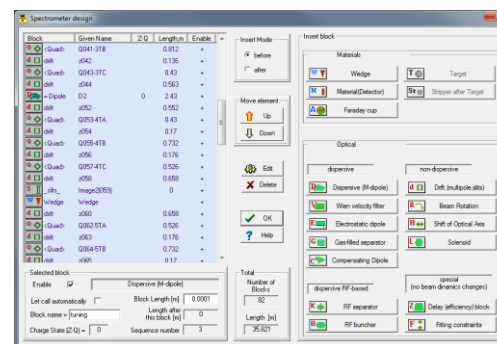
Setup scheme



Menus

1D-Plot	2D-Plot	Databases	Help	Target
Block selection distributions				Stripper
Angular distributions				tuning
Horizontal (X) space distributions				DR11
Vertical (Y) space distributions				SC_Q11
Momentum distributions				DR12
Energy distribution				SC_Q12
Total Kinetic Energy distributions				DR13
Electrostatic rigidity distributions				SC_Q13
Beam and Setting fragment charge state distributions				DR14
Debug distributions				D11
Debug information				FH21
Brho selection plot				DR21
Wedge selection plot				NSC_Q21
Isomeric Gamma spectrum				DR22
Transmission characteristics				NCS_Q23
Range distributions				DR24
Charge distributions				F1
Average ionic charge plot				DR25
Cross Section distributions				SC_Q24
Systematic distributions (Q-g, Q-gg, dBE, dBEsn)				DR26
Velocity after reaction				

Setup dialog ("Spectrometer design")



Setup window

P rojectile	40Ar16+
9.74 MeV/u	1 pA
F ragment	40Ar17+..17+ ->beam+
T arget	⁹ Be 10 n crin
S tr	Stripper
D tuning	Brho 1.0000 Tm
d DR11	standard 62.4 cm
Q SC_Q11	QUAD 4.05 IG
d DR12	standard 15.84 cm
Q SC_Q12	MULT -8.3445 IG
d DR13	standard 15.84 cm
Q SC_Q13	MULT 4.05 IG
d DR14	standard 55.33 cm
D D11	Brho 1.0000 Tm
S FH21	slits
d DR21	standard 55.06 cm
Q NCS_Q21	MULT 1.5616 IG
d DR22	standard 14.12 cm
Q NCS_Q22	MULT -3.5414 IG
d DR23	standard 14.12 cm
Q NCS_Q23	MULT 2.5505 IG
d DR24	standard 74.06 cm
S F1	slits
d DR25	standard 51.43 cm
Q SC_Q24	MULT 3.612 IG
d DR26	standard 15.84 cm
Q SC_Q25	MULT

* - show only "Active", if the corresponding option is set the "Preferences" dialog

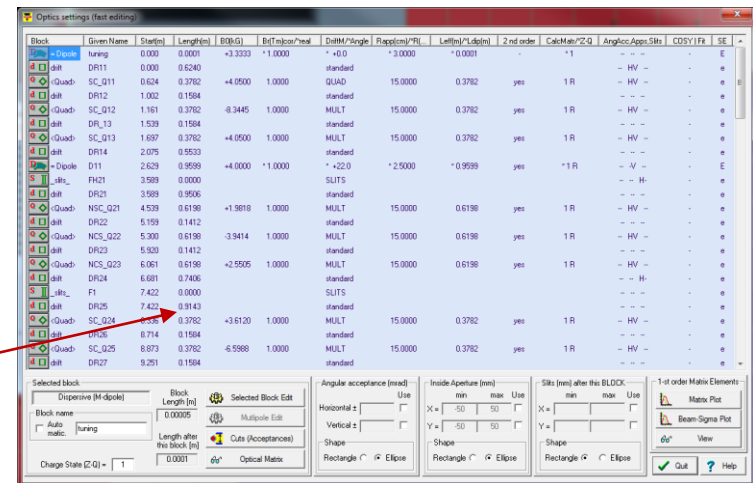
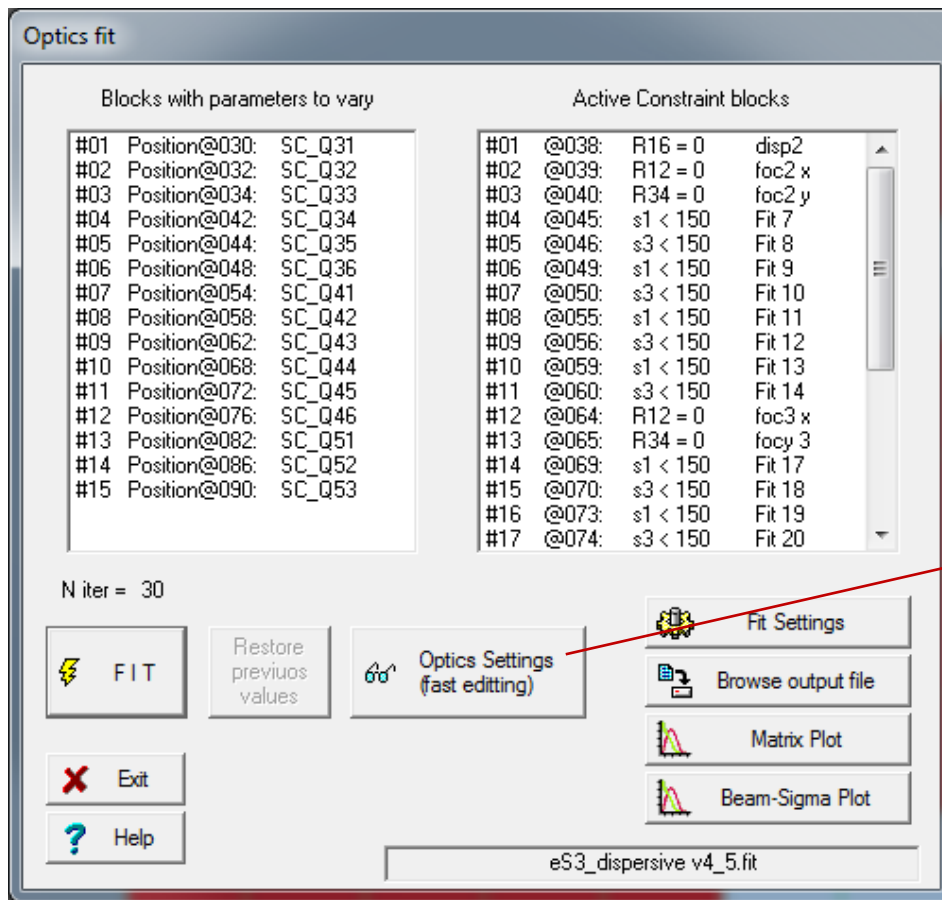
Optics settings (fast editing)

Block	Given Name	Length [m]	Enable	Block Length [m]	Length after No block [m]	Sequence number
Q1	Q101	0.001	+	0.001	0	1
Q2	Q102	0.001	+	0.001	0	2
Q3	Q103	0.001	+	0.001	0	3
Q4	Q104	0.001	+	0.001	0	4
Q5	Q105	0.001	+	0.001	0	5
Q6	Q106	0.001	+	0.001	0	6
Q7	Q107	0.001	+	0.001	0	7
Q8	Q108	0.001	+	0.001	0	8
Q9	Q109	0.001	+	0.001	0	9
Q10	Q110	0.001	+	0.001	0	10
Q11	Q111	0.001	+	0.001	0	11
Q12	Q112	0.001	+	0.001	0	12
Q13	Q113	0.001	+	0.001	0	13
Q14	Q114	0.001	+	0.001	0	14
Q15	Q115	0.001	+	0.001	0	15
Q16	Q116	0.001	+	0.001	0	16
Q17	Q117	0.001	+	0.001	0	17
Q18	Q118	0.001	+	0.001	0	18
Q19	Q119	0.001	+	0.001	0	19
Q20	Q120	0.001	+	0.001	0	20
Q21	Q121	0.001	+	0.001	0	21
Q22	Q122	0.001	+	0.001	0	22
Q23	Q123	0.001	+	0.001	0	23
Q24	Q124	0.001	+	0.001	0	24
Q25	Q125	0.001	+	0.001	0	25
Q26	Q126	0.001	+	0.001	0	26
Q27	Q127	0.001	+	0.001	0	27
Q28	Q128	0.001	+	0.001	0	28
Q29	Q129	0.001	+	0.001	0	29
Q30	Q130	0.001	+	0.001	0	30
Q31	Q131	0.001	+	0.001	0	31
Q32	Q132	0.001	+	0.001	0	32
Q33	Q133	0.001	+	0.001	0	33
Q34	Q134	0.001	+	0.001	0	34
Q35	Q135	0.001	+	0.001	0	35
Q36	Q136	0.001	+	0.001	0	36
Q37	Q137	0.001	+	0.001	0	37
Q38	Q138	0.001	+	0.001	0	38
Q39	Q139	0.001	+	0.001	0	39
Q40	Q140	0.001	+	0.001	0	40
Q41	Q141	0.001	+	0.001	0	41
Q42	Q142	0.001	+	0.001	0	42
Q43	Q143	0.001	+	0.001	0	43
Q44	Q144	0.001	+	0.001	0	44
Q45	Q145	0.001	+	0.001	0	45
Q46	Q146	0.001	+	0.001	0	46
Q47	Q147	0.001	+	0.001	0	47
Q48	Q148	0.001	+	0.001	0	48
Q49	Q149	0.001	+	0.001	0	49
Q50	Q150	0.001	+	0.001	0	50
Q51	Q151	0.001	+	0.001	0	51
Q52	Q152	0.001	+	0.001	0	52
Q53	Q153	0.001	+	0.001	0	53
Q54	Q154	0.001	+	0.001	0	54
Q55	Q155	0.001	+	0.001	0	55
Q56	Q156	0.001	+	0.001	0	56
Q57	Q157	0.001	+	0.001	0	57
Q58	Q158	0.001	+	0.001	0	58
Q59	Q159	0.001	+	0.001	0	59
Q60	Q160	0.001	+	0.001	0	60
Q61	Q161	0.001	+	0.001	0	61
Q62	Q162	0.001	+	0.001	0	62
Q63	Q163	0.001	+	0.001	0	63
Q64	Q164	0.001	+	0.001	0	64
Q65	Q165	0.001	+	0.001	0	65
Q66	Q166	0.001	+	0.001	0	66
Q67	Q167	0.001	+	0.001	0	67
Q68	Q168	0.001	+	0.001	0	68
Q69	Q169	0.001	+	0.001	0	69
Q70	Q170	0.001	+	0.001	0	70
Q71	Q171	0.001	+	0.001	0	71
Q72	Q172	0.001	+	0.001	0	72
Q73	Q173	0.001	+	0.001	0	73
Q74	Q174	0.001	+	0.001	0	74
Q75	Q175	0.001	+	0.001	0	75
Q76	Q176	0.001	+	0.001	0	76
Q77	Q177	0.001	+	0.001	0	77
Q78	Q178	0.001	+	0.001	0	78
Q79	Q179	0.001	+	0.001	0	79
Q80	Q180	0.001	+	0.001	0	80
Q81	Q181	0.001	+	0.001	0	81
Q82	Q182	0.001	+	0.001	0	82
Q83	Q183	0.001	+	0.001	0	83
Q84	Q184	0.001	+	0.001	0	84
Q85	Q185	0.001	+	0.001	0	85
Q86	Q186	0.001	+	0.001	0	86
Q87	Q187	0.001	+	0.001	0	87
Q88	Q188	0.001	+	0.001	0	88
Q89	Q189	0.001	+	0.001	0	89
Q90	Q190	0.001	+	0.001	0	90
Q91	Q191	0.001	+	0.001	0	91
Q92	Q192	0.001	+	0.001	0	92
Q93	Q193	0.001	+	0.001	0	93
Q94	Q194	0.001	+	0.001	0	94
Q95	Q195	0.001	+	0.001	0	95
Q96	Q196	0.001	+	0.001	0	96
Q97	Q197	0.001	+	0.001	0	97
Q98	Q198	0.001	+	0.001	0	98
Q99	Q199	0.001	+	0.001	0	99
Q100	Q200	0.001	+	0.001	0	100

Monte Carlo calculation of fragment transmission

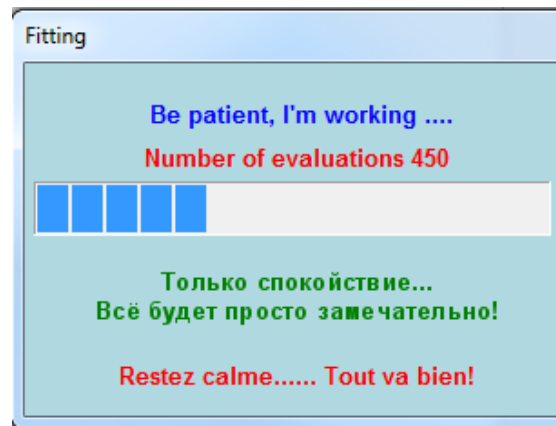


Call the "Fast Edit Optics" dialog from the Optics optimization dialog



Without leaving the “Optics fit” dialog it is possible to load the Fast Optics Edit” dialog where you can set/unset “Active” properties, modify Fitting constraint block parameters, or enter a Quad field value.

Press the “Escape”
button to cancel the
minimization procedure



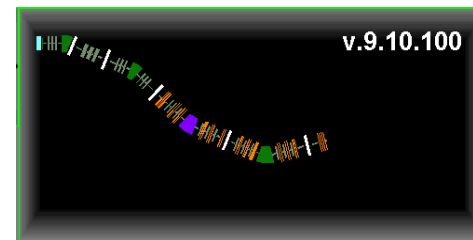
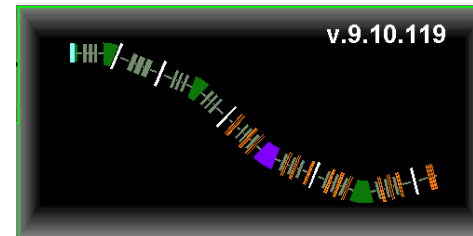
```
#26: foc4 x      +1.036e-02   +2.328e-03   1.000e-03   2.328e+00   | = +0.00e+00
#27: foc4 y      +7.946e-02   -3.101e-02   1.000e-01   3.101e-01   | = +0.00e+00
#28: disp4      +1.077e+01   +1.048e-02   1.000e-02   1.048e+00   | = +0.00e+00
#29: beamy4      +3.799e+00   +1.446e+01   1.000e-01   3.913e-03   | < +2.00e+01
```

```
=> Results for eS3_dispersive v4_5.fit:
Termination reason: USER BREAK after 600 evaluations!
```

```
Minimization info:
0: 1.160e+06      ||e||_2 at initial p
1: 1.153e+02      ||e||_2
2: 3.298e+03      ||J^T e||_inf
3: 7.967e-29      ||Dp||_2
4: 1.377e-05      mu/max[J^T J]_ii
5: 300            # iterations
```

- New functions BLOCKnext and BLOCKprevious with "noFit" options

- Corrections for Separator scheme in the case of Fitting block



- “SetFocus” back in the Fast Edit Optics dialog

- Minimization output modification

*11: SC_Q45	-1.0e+01	<	-6.060e+00	<	+0.0e+00	-6.406e+00	
*12: SC_Q46	+0.0e+00	<	+3.296e+00	<	+1.0e+01	+2.890e+00	
*13: SC_Q51	+0.0e+00	<	+2.517e+00	<	+1.0e+01	+2.798e+00	
*14: SC_Q52	-1.0e+01	<	-5.905e+00	<	+0.0e+00	-5.845e+00	
*15: SC_Q53	+0.0e+00	<	+3.202e+00	<	+1.0e+01	+3.456e+00	

Fitting values:	Initial	Final	Precision	(Fin-Des)/P	Desired
*01: disp2	+1.158e-01	+8.581e-02	1.0e-02	+8.581e+00	= 0
*02: foc2 x	+3.150e-04	-3.143e-04	1.0e-03	+3.143e-01	= 0
*03: foc2 y	+5.912e-01	+6.146e-01	1.0e-01	+6.146e+00	= 0
*04: Fit 7	+2.487e+01	+3.303e+01	1.0e-01	0	< 150
*05: Fit 8	+2.314e+01	+3.266e+01	1.0e-01	0	< 150
*06: Fit 9	+3.827e+01	+5.153e+01	1.0e-01	0	< 150
*07: Fit 10	+1.665e+01	+2.289e+01	1.0e-01	0	< 150
*08: Fit 11	+1.014e+02	+8.777e+01	1.0e-01	0	< 150
*09: Fit 12	+2.119e+01	+2.143e+01	1.0e-01	0	< 150
*10: Fit 13	+1.433e+02	+1.278e+02	1.0e-01	0	< 150
*11: Fit 14	+2.145e+01	+2.170e+01	1.0e-01	0	< 150
*12: foc3 x	-5.376e-03	-2.484e-03	1.0e-02	+2.484e-01	= 0
*13: foc3 y	-5.088e-02	-4.954e-02	1.0e-01	+4.954e-01	= 0
*14: Fit 17	+1.487e+02	+1.239e+02	1.0e-01	0	< 150
*15: Fit 18	+2.367e+00	+2.228e+00	1.0e-01	0	< 150
*16: Fit 19	+6.993e+01	+6.356e+01	1.0e-01	0	< 150
*17: Fit 20	+5.935e+00	+6.123e-01	1.0e-01	0	< 150
*18: Fit 21	+2.821e+01	+3.745e+01	1.0e-01	0	< 150

- The Kicker dialog modification
- Correction to Output file format for MC plots
- ID modifications for CS-Qgg & CS&dBE plots
- Monte Carlo : modifications for Eloss and Range with Faraday cup
- New Super-FRS configurations
- Kantele calculator: Gamspeed modifications
- "Options" dialog large revision