

NEWS FROM THE VITESS PROJECT INCLUDING MCPL SUPPORT

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HISTORY AND STATUS

Initiative

- Idea of Ferenc Mezei to realize a package well suited to simulate instruments on neutron spallation sources: VITESS (Virtual Instrumentation Tool for the European Spallation Source)

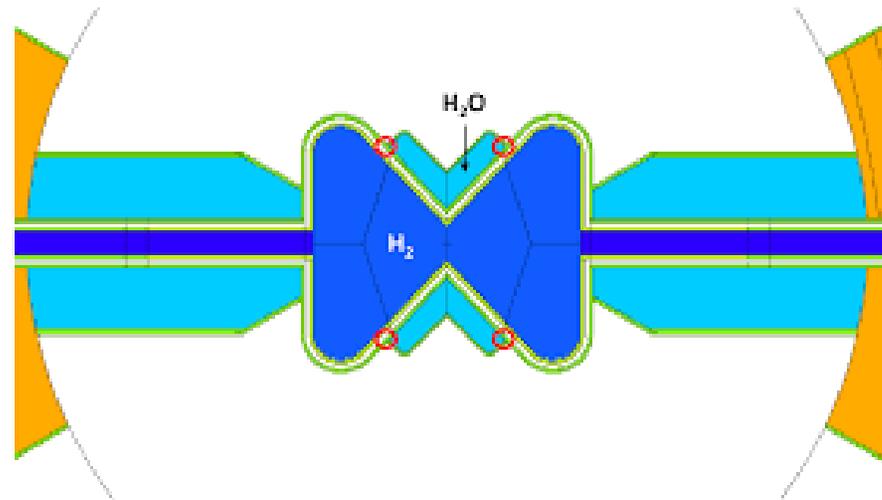
Important dates

- 1999: Release of VITESS 1.0 (First complete instruments simulated)
- 2000 - 2005: Fast development under SCANS and MCNSI collaboration
 - 2001: Release of VITESS 2.0 containing polarisation, absolute flux values, improved GUI
 - Several ESS, HMI, JCNS instruments simulated (MagPow, EXED, VSANS, MARIA, POWTEX, ...)
- 2005: HMI stops support of VITESS
- 2006: VITESS released under GNU license (developers working part time on VITESS)
- 2010 - 2013: Fast development during ESS Design Upgrade Phase (German Workpackage K7)
 - 2012: Release of VITESS 3.0 containing instrument visualization and optimization
 - Several ESS instruments simulated (DREAM, Hor. Reflectometer, ESSEX, T-REX, MIRACLES, ...)
- 2014 - 2018: VITESS still alive with minor support from HZB
- 2018: Latest release: VITESS 3.4
- 2019: VITESS hosted by FZ Jülich (initiative of S. Mattauch, A. Ioffe, J. Voigt, W. Schweika, Th. Brückel)

NEW FEATURES IN VITESS 3.4

Overview

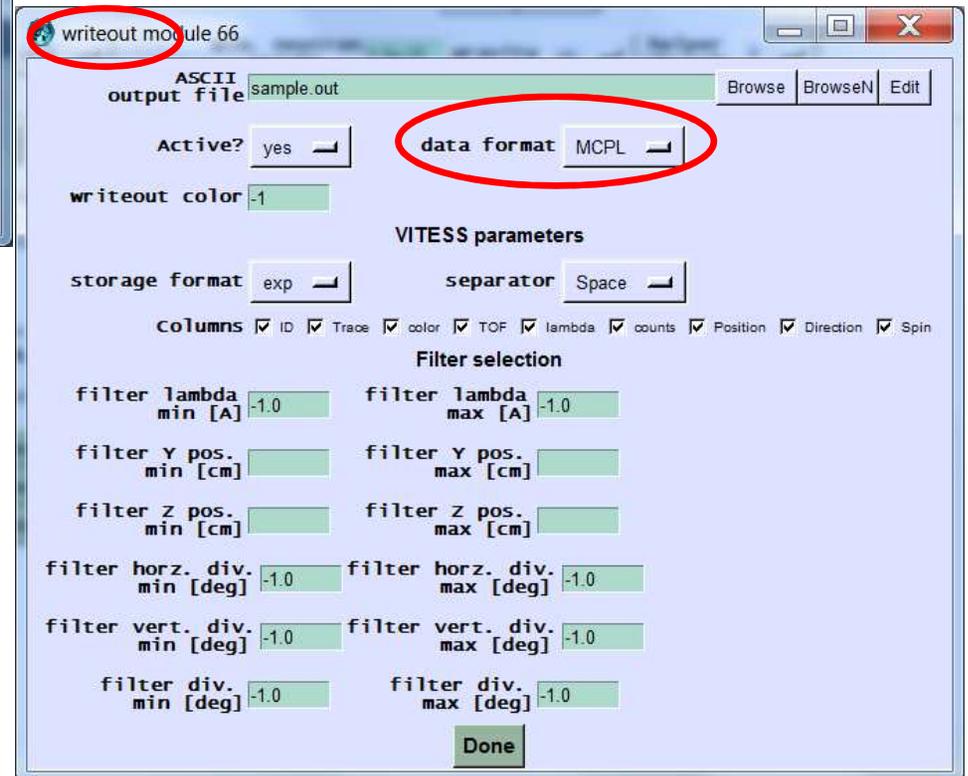
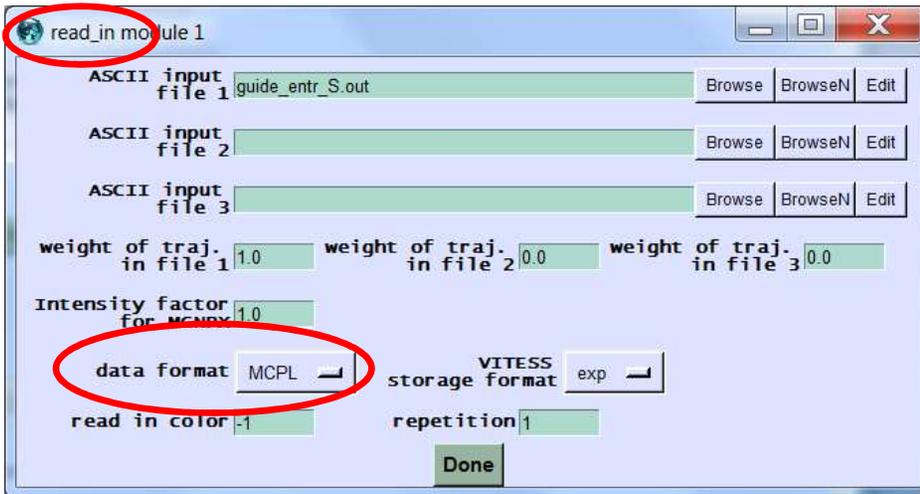
- Released: 9 Oct 2018
- Main new features
 - MCPL import and export
 - ESS Butterfly 1 moderator
- A few minor corrections, e.g. in the module ,filter‘



NEW FEATURES IN VITESS 3.4

MCPL Import and Export

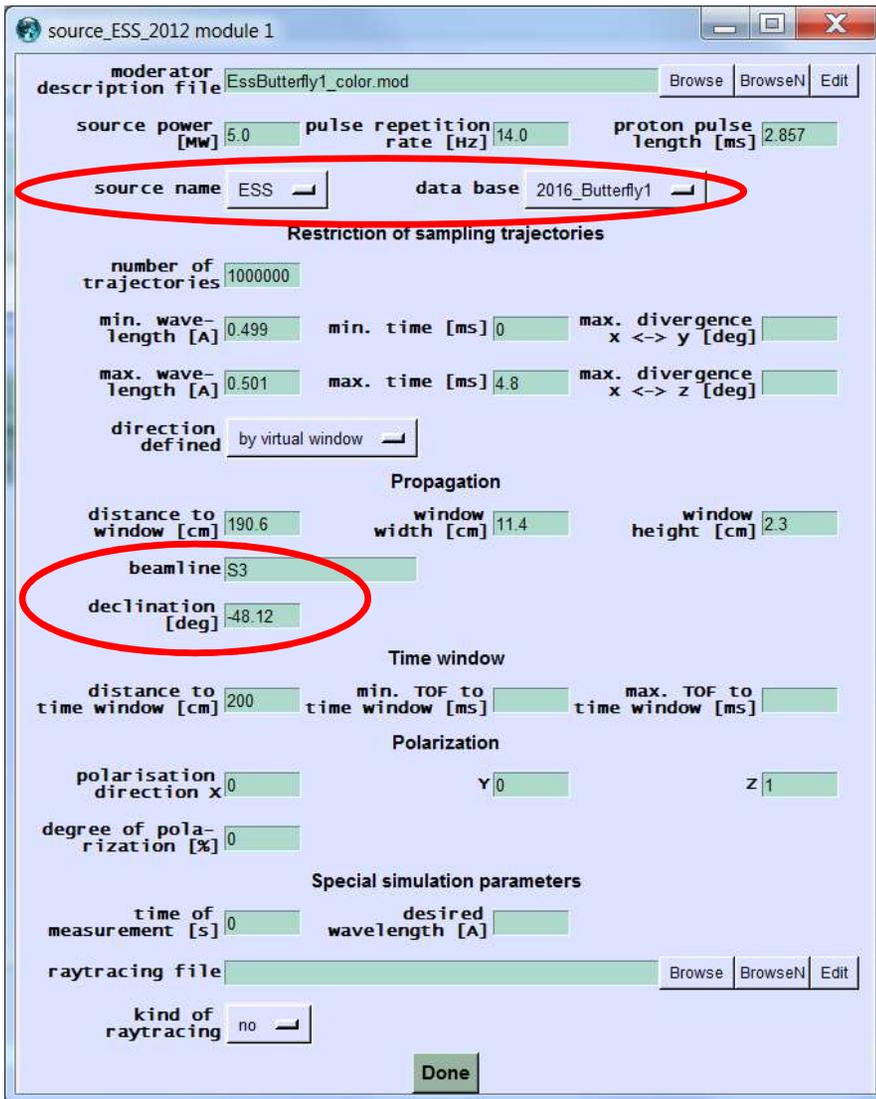
- Formats now available for import and output
 - VITESS
 - McStas
 - MCPL
 - MCNPX



- Realization
 - Included in modules read_in and writeout (read_in replaces a source module)
 - Using Code 'mcpl.h'/'mcpl.c' by Thomas Kittelmann (some tuning needed to get it compiled and linked)

NEW FEATURES IN VITESS 3.4

ESS Butterfly 1 Moderator



ESS2016_S3.dat - Notepad

#	pos [cm]	flux thm [n/cm ² sr]	flux cold [n/cm ² sr]
-9.20	19.0E+12	5.0E+12	
-8.40	19.0E+12	8.0E+12	
-8.20	9.0E+12	37.0E+12	
-8.00	6.5E+12	48.0E+12	
-5.00	6.5E+12	49.0E+12	
-4.00	6.2E+12	60.0E+12	
-1.90	7.5E+12	64.0E+12	
-1.20	9.5E+12	50.0E+12	
-0.55	24.0E+12	14.0E+12	
0.70	22.0E+12	6.0E+12	
1.80	21.0E+12	5.0E+12	
2.00	26.5E+12	6.0E+12	
6.60	20.0E+12	5.0E+12	
6.90	18.0E+12	29.0E+12	
7.00	7.0E+12	35.0E+12	
10.50	7.5E+12	20.0E+12	
11.40	18.0E+12	5.5E+12	
14.90	13.0E+12	3.0E+12	

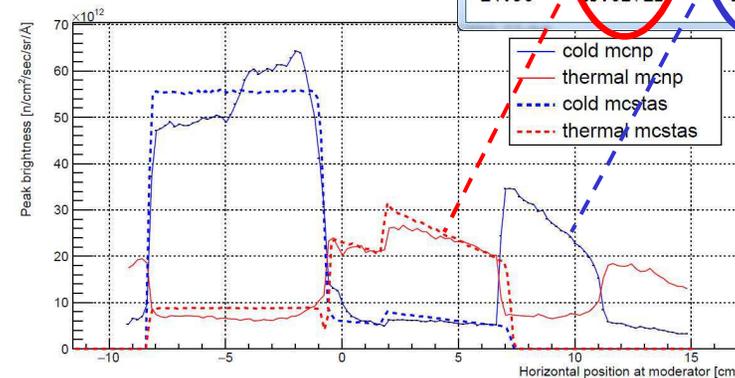
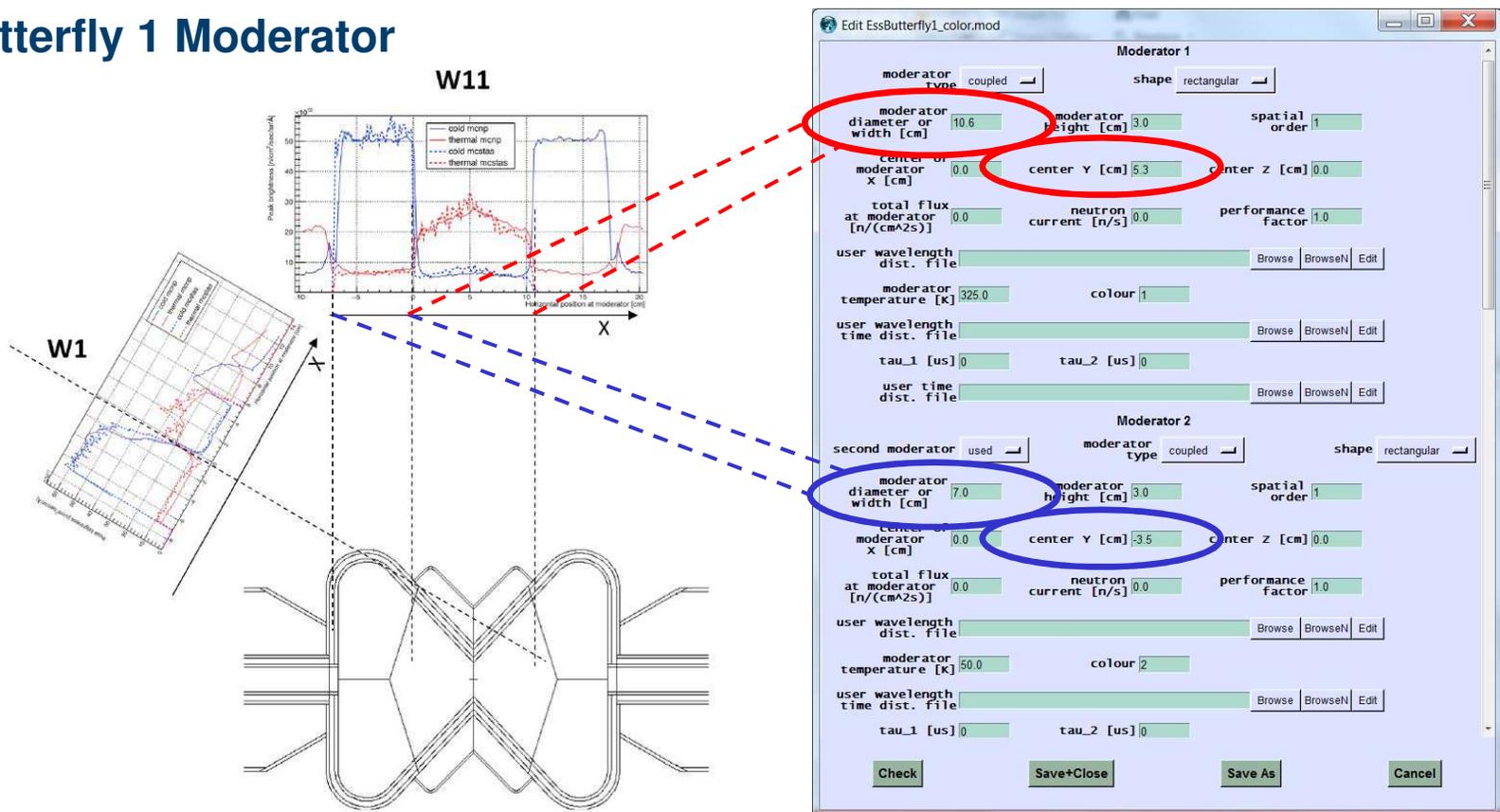


Figure 20: Like Fig. 18 for the W3 beamport. These distributions are also valid for the S3, E3 and N3 beamports.

- Beamport or declination have to be given to define the instrument direction
- The source module needs a file describing the intensity distribution for this port, which exists only for S3 (=N3) so far

NEW FEATURES IN VITESS 3.4

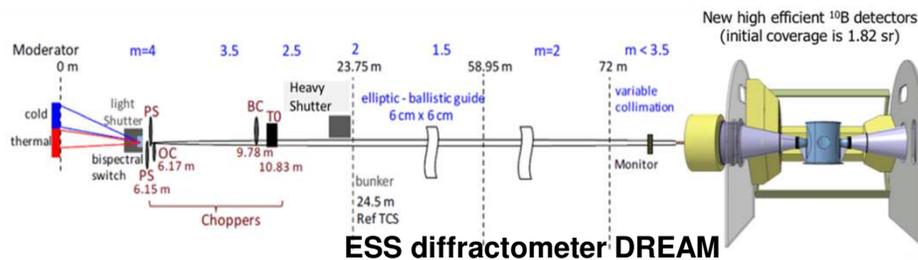
ESS Butterfly 1 Moderator



- This choice of moderator widths and positions means that
 - Only the cold moderator on the left side is considered
 - Both moderators are considered in full width in all directions
- An adaption to the co-ordinate system of the instrument is best realized by a succeeding 'frame' module

VITESS @ JCNS, FZ JÜLICH

- New homepage, preferably something close to “www.vitess.org”
- New GUI, probably Qt
- Support for all platforms
- More flexible design
- Better IT support for the development
- More collaborations

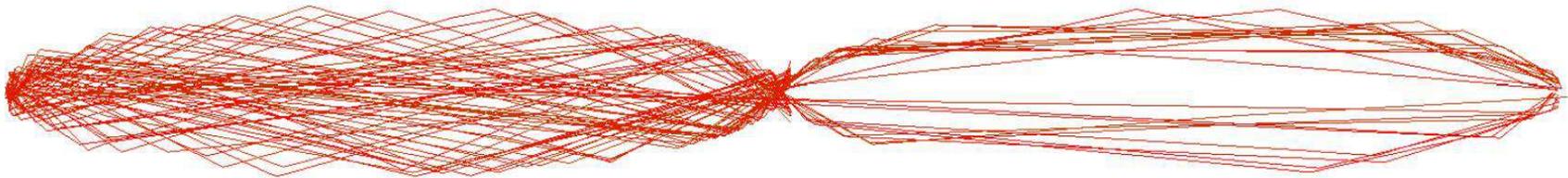


- VITESS is foreseen to be used in the following FZJ projects
 - Completion of the design of the 4 ESS instruments that FZJ is involved in
 - Instrument suite for the accelerator driven neutron source (HBS project)
 - Instrumentation of the PIK reactor in Gatchina (close to St. Petersburg)
 - Upgrade of JCNS instruments at FRM-2 – MLZ2030
 - Transfer of 3 instruments from BER-II to FRM-2 (i.e. FLEXX)
 - Virtual experiments at FRM-2

NEW FEATURES IN VITESS 3.5

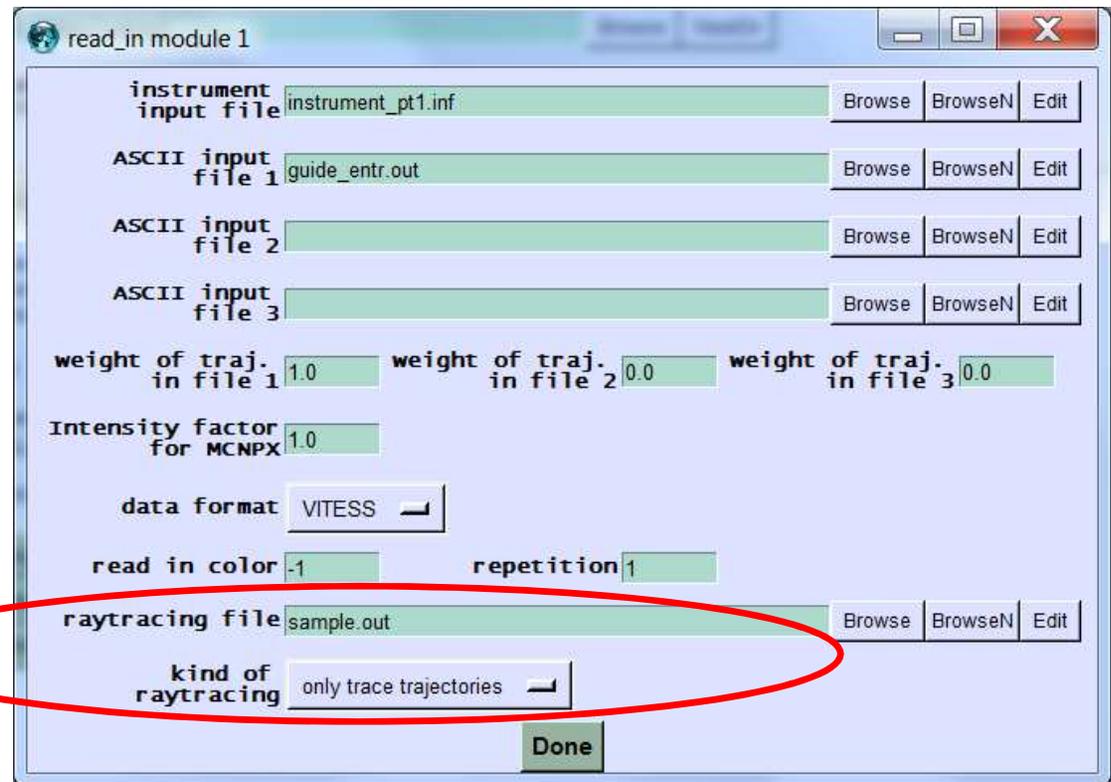
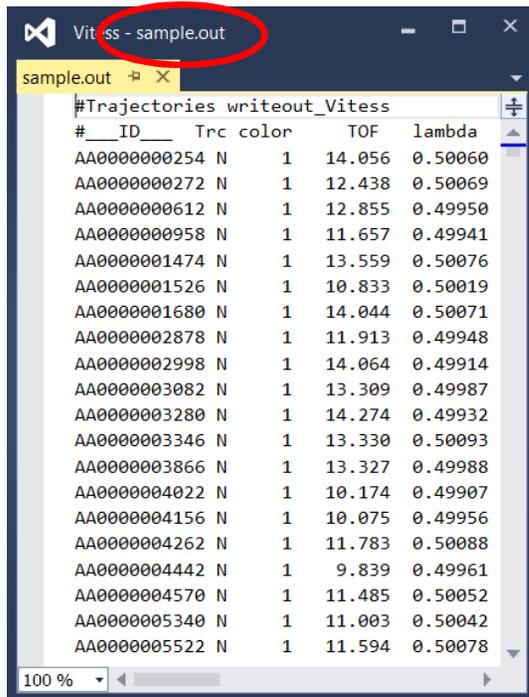
Overview

- Improved import and export of event files (neutron trajectories)
- Rotating monochromator
- Blow up of width and height of the instrument in the visualization
- Editable file describing the instrument
- Twisted guide (if needed for REFSANS)



NEW FEATURES IN VITESS 3.5

Improved Import and Export

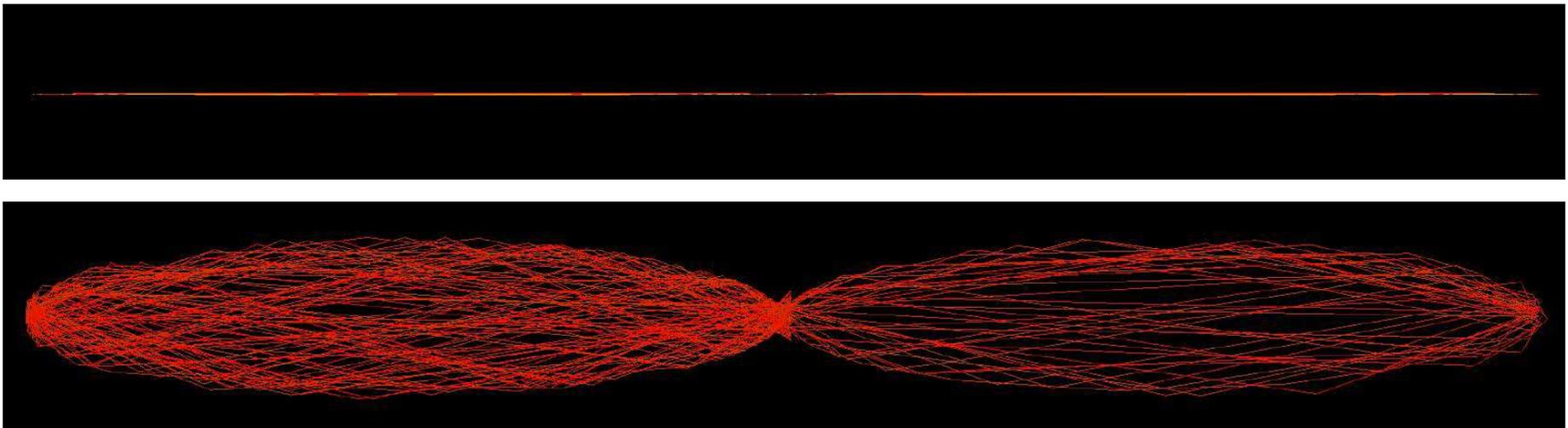


- Selection of trajectories (=events) that are read - already realized
 - The same feature as in the 'source' module
 - A list of trajectory IDs is read (in this case from the file 'sample.out')
 - Only those that appear in the list are read and started
- Binary input and output also via 'read_in' and 'writeout' - to be done

NEW FEATURES IN VITESS 3.5

Blow up

- At sources like the ESS, instruments are often very long. The length can be a factor of 1000 larger than width and height. This makes a visualization in 1:1:1 scale quite useless (see upper Figure)
- A blow-up factor for width and height as already used in a special application (see lower Figure) shall become a general visualization parameter



50 trajectories inside a double elliptic neutron guide of 2x50 m length and 100 mm maximal width, visualized in normal 1:1:1 scale and by a blow-up factor of 100 perpendicular to the beam direction.

NEW FEATURES IN VITESS 3.5

Editable Instrument Description File (.eid)

- Purpose
 - Comparison of instruments
 - Combination of parts from different instruments (and other ways of instrument development)
 - May replace 'Instrument.gui' in the future
- Format
 - Not yet fixed
 - Common format with other packages (McStas, RESTRAX) would be useful

existing

Instrument.gui



planned

Instrument.eid



existing

Instrument.tcl
Instrument.pl
Instrument.py
Instrument.bat



VITESS
program

PLANS FOR THE FUTURE

- New GUI: Switching from Tcl/Tk to Qt.
- Program concept that allows
 - Parallel components (e.g. 2 parallel guides)
 - Tracing neutrons back to previous components (e.g. ... sample – sample environment – sample ...)
- New Options
 - A web application especially for long simulations running on a cluster of FZJ (instead of GPU support)
 - Inclusion of OpenMP or MPI
 - Determination of neutron intensity loss along the beamline
- Further ideas
 - Separation of simulation parameters from source parameters
 - Better support for numerical optimization
 - Better solution to disable components
- Manual

Thanks a lot for your attention!