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VITESS 3.0

Daniil Nekrassov
on behalf of the
VITESS HZB Team

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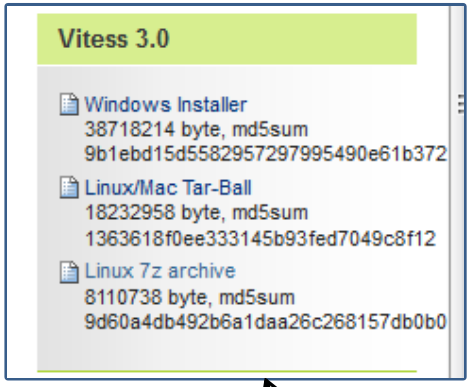
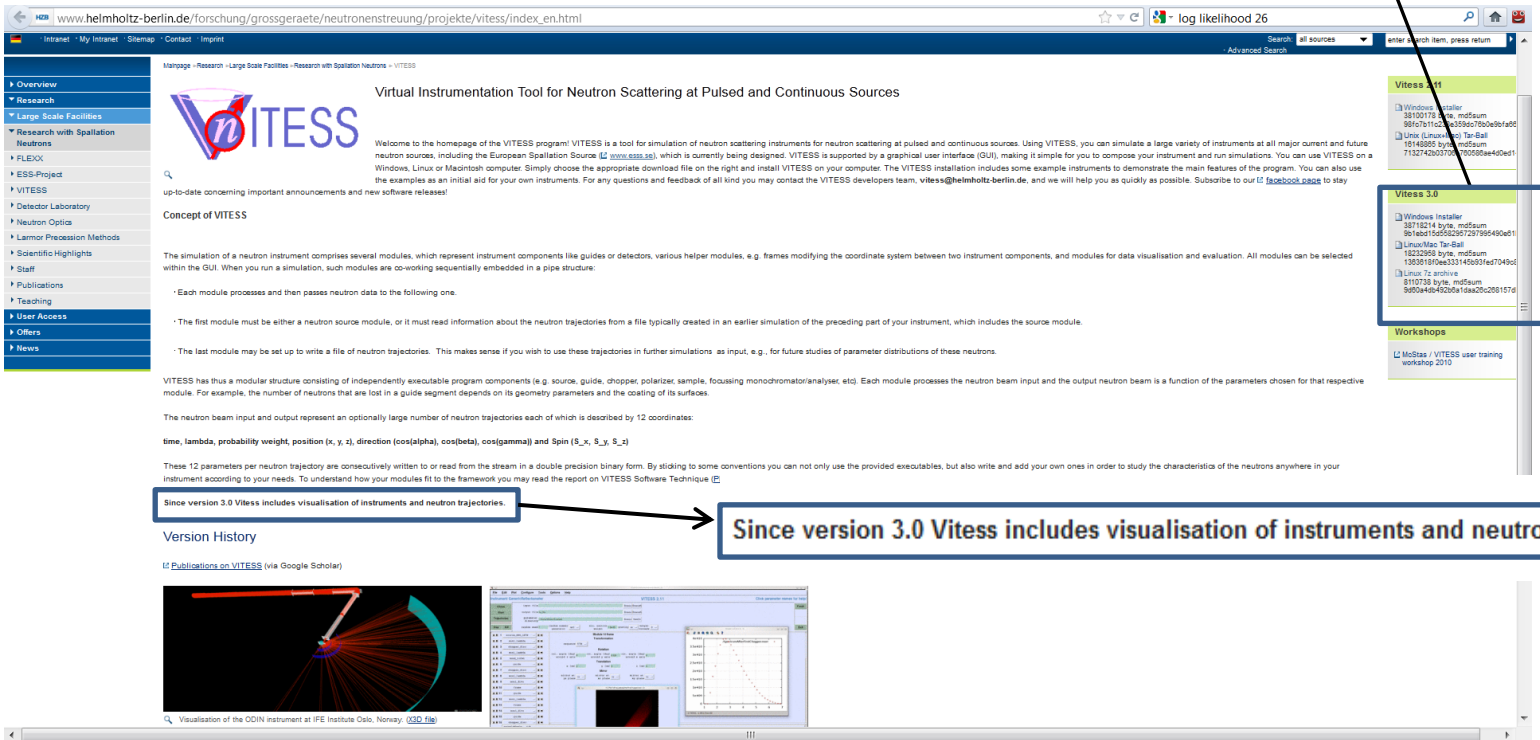
VITESS 3.0 RELEASE

- Vitess 3.0 was officially released on 23.11.12
- Step in version number from 2.11 to 3.0, because
  - It was promised! ☺
  - Main new feature: **Visualisation**
  - Other new features and improvements also included...





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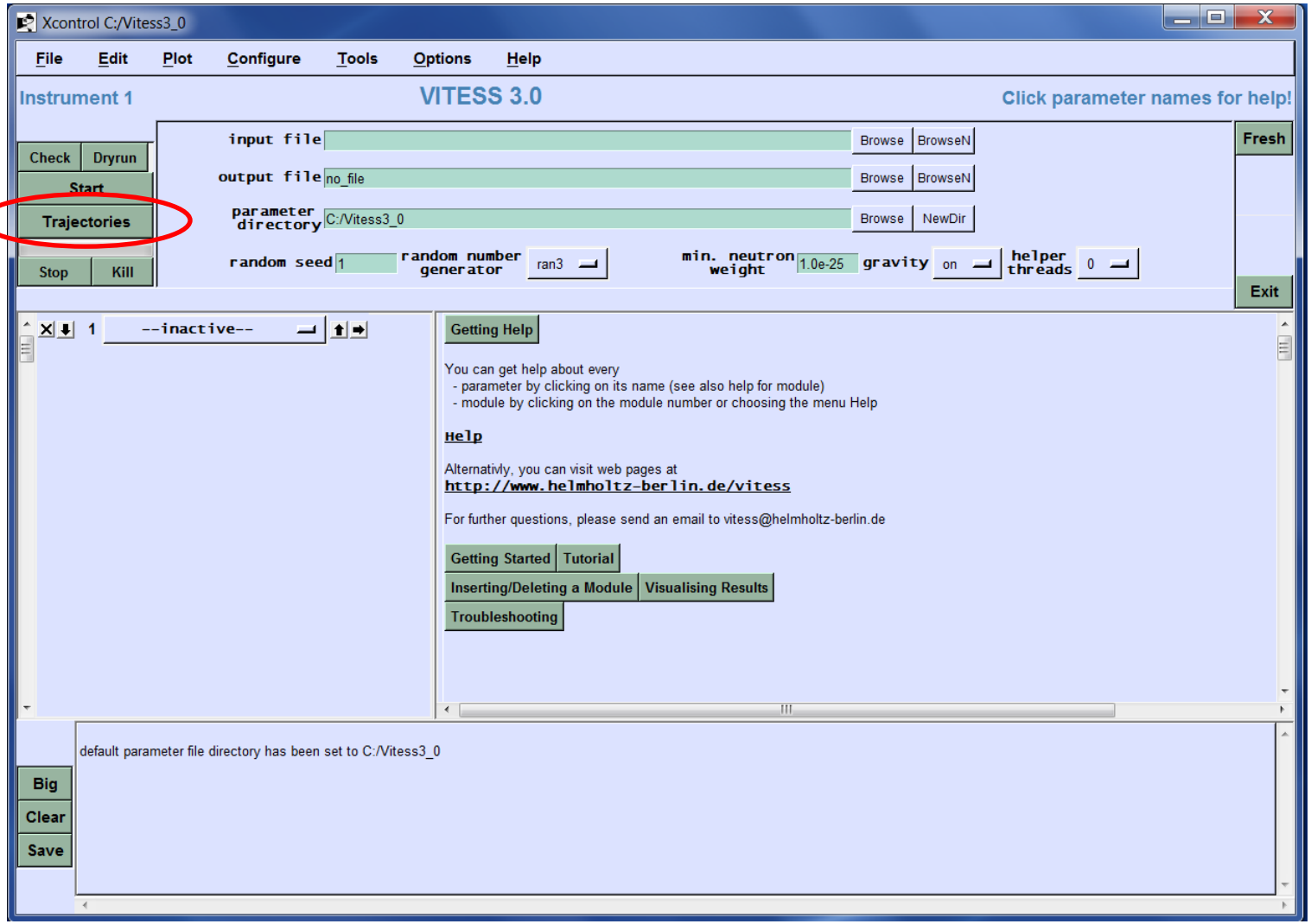
VITESS 3.0: VISUALISATION



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VISUALISATION

DEMONSTRATION

VISUALISATION CONCEPT

- Visualisation of instrument components
    - Each component is defined by (a combination of) geometrical shapes like rectangles, circles, boxes etc...
    - Each module with implemented visualisation stores the geometrical information=geometry, including color
    - Each geometry is placed in the **global** coordinate system and then written to a common ascii file (geometry.inf)
    - Dedicated routine converts the geometry data to an .x3d file
    - Result: 3D model of the instrument

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geometry.inf

```
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#units
#  [m]  position, length, width, height, radius
# [deg] angels
#
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Rectangle         2.70000   -0.02634    0.00000      0.01920    0.99982    0.00000       0.20004    0.12000     0.00000 :green
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Hull              3.37500    0.00000    0.00000      1.00000    0.00000    0.00000       0.05000    0.06211     0.06158      0.06211    0.06158    0.00000   :yellow
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```

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geom_1 - Notepad

File Edit Format View Help

geometry.x3d

```
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```

VISUALISATION CONCEPT

- Visualisation of neutron trajectories
    - Each component writes out locations in the instrument, at which:
    - Neutrons enter, exit and interact with the component
    - Data is combined and written to an ascii file
    - Dedicated routine stores the trajectories in the same x3d file
- Planned: Visualisation of a subset of neutrons
- Apart from visualisation, other applications are possible, e.g. background estimations

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VISUALISATION CONCEPT

Trajectory file

```
# Trajectories
#
# units
#  [m]  position
# [Ang] lambda
# [n/s] weight
#
#     ID       color   lambda     weight        pos_x      pos_y      pos_z   spin rsn
AA0000000001       0   0.81370   0.000e+000     3.00000   -0.02551    0.01780   -1   4
AA0000000002       0   3.13384   0.000e+000     3.00000   -0.01530    0.01335    1   4
AA0000000003       0   8.41722   0.000e+000     3.00000    0.02339    0.00525   -1   4
AA0000000004       0   5.57237   0.000e+000     3.00000    0.02444    0.00682    1   4
AA0000000006       0   8.06436   0.000e+000     3.00000   -0.06541    0.01542   -1   4
AA0000000008       0   8.57656   0.000e+000     3.00000    0.02116   -0.01200   -1   4
AA0000000011       0   1.46195   0.000e+000     3.00000   -0.01955    0.02350    1   4
AA0000000012       0   9.84761   0.000e+000     3.00000   -0.00004    0.02680   -1   4
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AA0000000016       0   4.56912   0.000e+000     3.00000   -0.01166    0.01862   -1   4
AA0000000018       0   6.61643   0.000e+000     3.00000    0.02531    0.02845    1   4
AA0000000019       0   8.56054   0.000e+000     3.00000    0.01422    0.02910    1   4
AA0000000021       0   8.19619   0.000e+000     3.00000    0.02066    0.01093    1   4
AA0000000022       0   9.80664   0.000e+000     3.00000    0.02821   -0.03128    1   4
AA0000000023       0   2.13285   0.000e+000     3.00000    0.01497    0.02871    1   4
AA0000000025       0   6.11253   0.000e+000     3.00000    0.03262    0.02276    1   4
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AA0000000035       0   5.44885   0.000e+000     3.00000   -0.01688   -0.02942   -1   4
AA0000000036       0   9.44954   0.000e+000     3.00000   -0.02681   -0.00125   -1   4
AA0000000037       0   0.88671   0.000e+000     3.00000    0.02074    0.00593   -1   4
AA0000000038       0   9.12905   0.000e+000     3.00000    0.00837   -0.00576    1   4
AA0000000039       0   8.49515   0.000e+000     3.00000    0.01042   -0.01595   -1   4
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AA0000000045       0   6.66208   0.000e+000     3.00000    0.03252    0.02971    1   4
AA0000000046       0   0.53271   0.000e+000     3.00000   -0.04542   -0.02534   -1   4
AA0000000047       0   9.98325   0.000e+000     3.00000    0.01998   -0.01051   -1   4
AA0000000049       0   6.05058   0.000e+000     3.00000    0.01614    0.00621    1   4
AA0000000051       0   1.39879   0.000e+000     3.00000    0.02962    0.00479    1   4
```

VITESS 3.0: ELLIPTIC GUIDE MODULE

- Elliptic guides have recently received a lot of attention, appears to be a good solution for long guides, e.g., at the ESS
- Until VITESS 3.0: Guides are comprised of interpolated segments for all shapes
- L. Cussen et al. (to appear in NIM A, http://www.sciencedirect.com/science/article/pii/S0168900212015306): Propagation in elliptic guides is **very** sensitive to deviations from ideal flight paths
- → Segmentation introduces artifacts
- Solution: Dedicated module describing propagation in elliptic guides analytically (in one or both dimensions)
- Speeds up calculations up to 2-3 orders of magnitude (for segmentation of the order of 1cm)!
- Yields results in agreement with the conventional guide module

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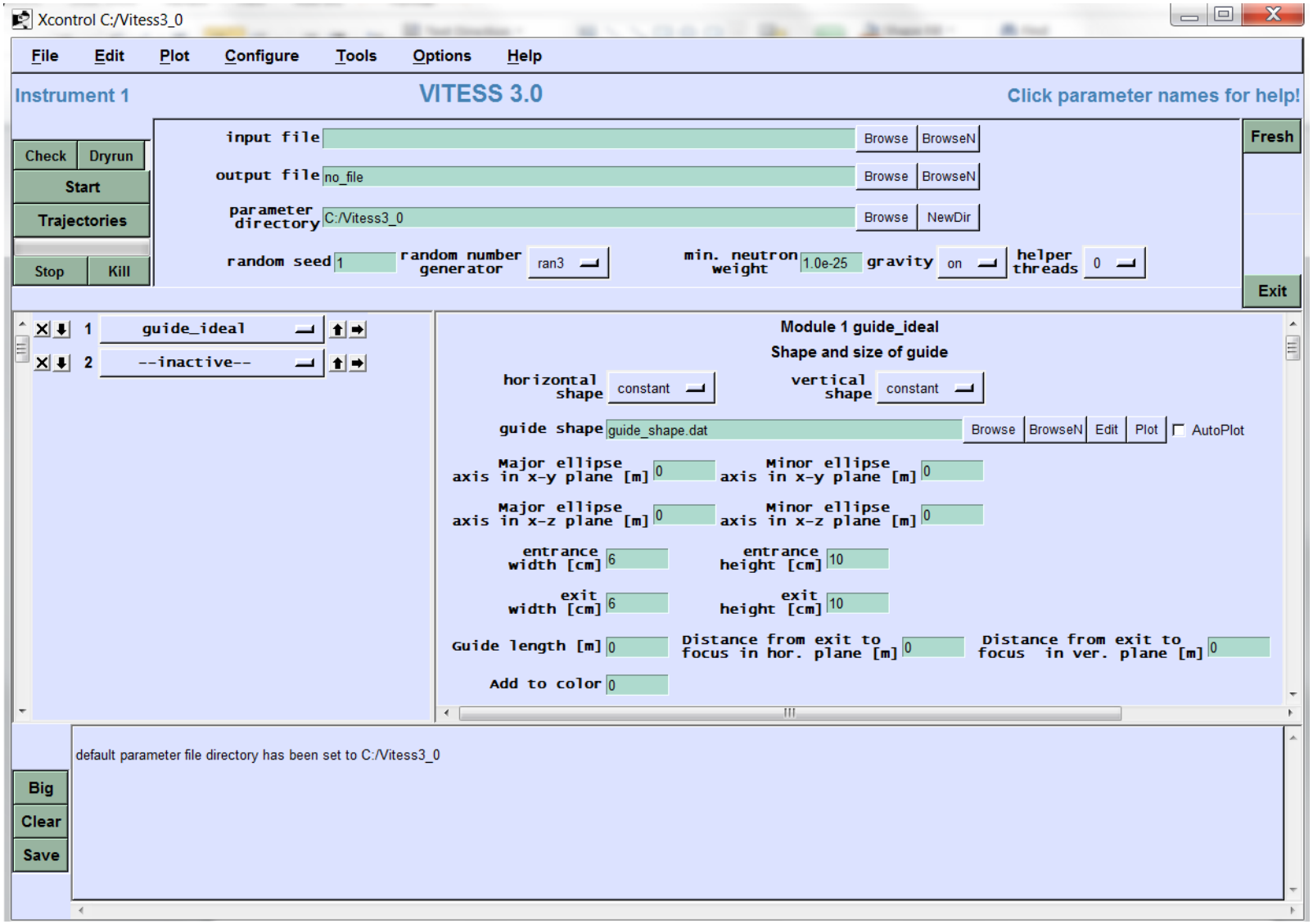
VITESS 3.0: ELLIPTIC GUIDE MODULE



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VITESS 3.0: OTHER FEATURES

- Brilliance monitor, brilliance used a lot for guide layout comparisons
- Generic 1D and 2D monitors
    - 2D monitor allows for arbitrary parameter combination
- New sources: FRM-2, ESS updated
- Re-import of pipes, e.g., from cluster jobs
- Transition mode for the monochromator
- Incoherent background for reflectometer sample
- Guides and sm_ensemble count reflections, guides discriminate between x-y and x-z plane
- ...

OUTLOOK

- Plan to release Vitess 3.1 in the first half of 2013
- Main foreseen changes:
    - Completion of visualisation
    - Optimization framework
    - Support of splitted cluster jobs
    - Detector: Event mode, compound geometry
    - Tool for design of extraction systems
    - GUI...
- Hope to collect feedback from users, in particular on visualisation issues
- VITESS went Facebook! ☺

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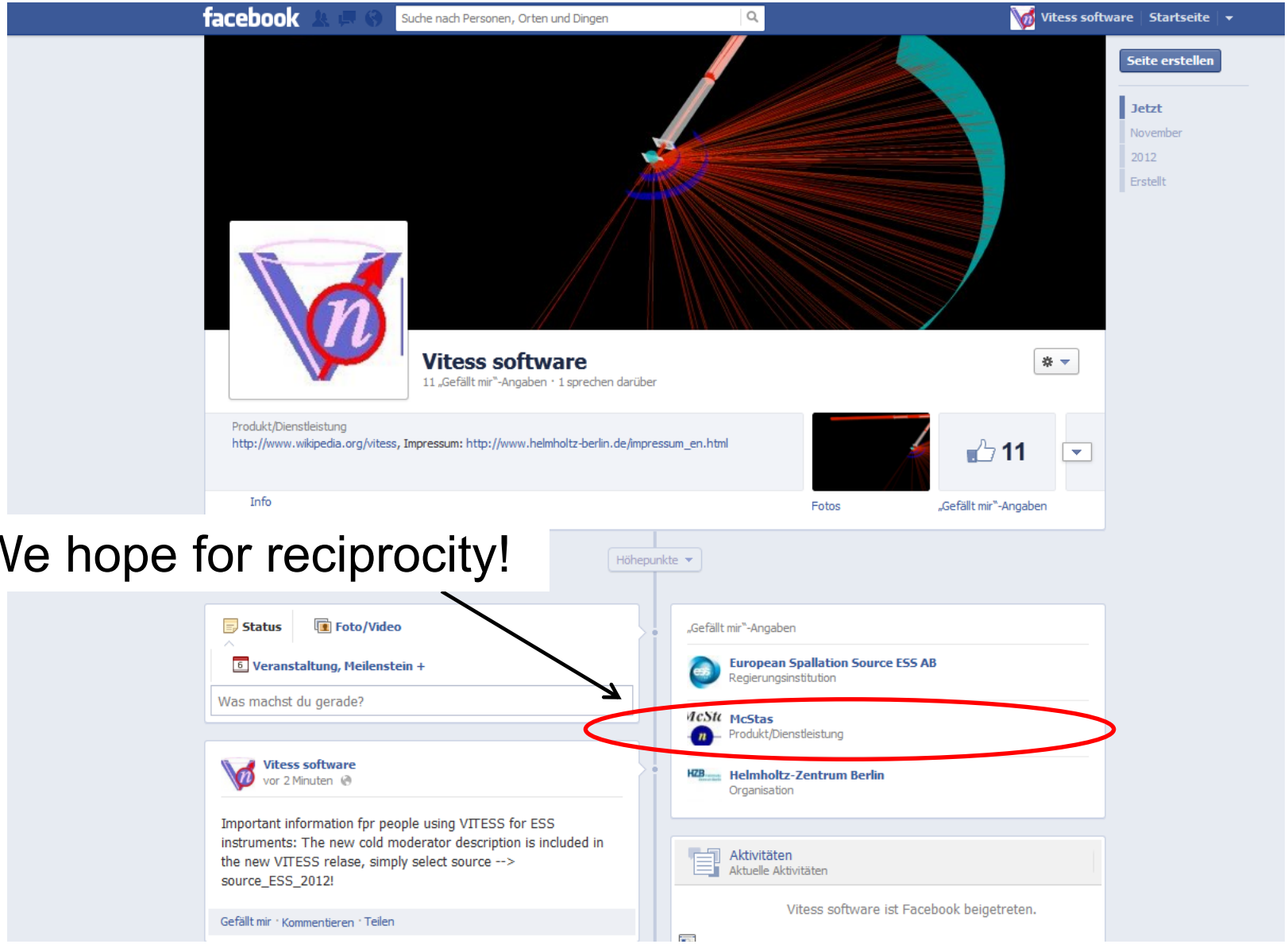

We hope for reciprocity!

THANK YOU FOR YOUR ATTENTION

VITESS HZB TEAM

Carolin Zendler, Daniil Nekrassov, Michael Fromme, Klaus Lieutenant

Contributing

Andreas Houben (FZJ), Sergei Manoshin (JINR), Alexander Joffe(JCNS),
Mirko Boin (HZB), Jennifer Schulz (HZB)