

BornAgain - Refactoring #2410

Core: beam propagation: Speeding up computations on samples with a large number of layers

21 Oct 2019 10:23 - dmitry

Status:	Backlog	Start date:	21 Oct 2019
Priority:	Normal	Due date:	
Assignee:	rbeerwerth	% Done:	0%
Category:		Estimated time:	0.00 hour
Target version:			
Description			
<p>Despite recent speed up in computations on a large number of layers, the computation complexity is still $O(N^2)$, where N is the number of layers in the sample. The computation engine is capable of working with worst-case complexity of $O(N \log N)$.</p> <p>The reason for such slow computations is in <code>INode::createParameterTree()</code>:</p> <ol style="list-style-type: none">To build string paths it computes the number of copies of same-type objects in the sample. Each of the uniform objects requires the counting of its siblings, total complexity of the computation being $O(N^2)$. This problem can be solved as in pull-request 881, providing 1.5 times speed-up on 1000 layer-thick sample.Second problem is the string concatenation and reallocation: if optimized, it can provide another factor of 2 speed-up on 1000 layers. One can find a screenshot of <code>kcachegrind</code> output in the same PR. <p>To measure the performance, one can use the dedicated performance test in <code>Tests/Functional/Core/CoreSpecial/MultilayerPerformanceTest.(h,cpp)</code></p>			
Related issues:			
Related to BornAgain - Refactoring #2343: Improve performance in reflectometr...		Rejected	30 Apr 2019
Related to BornAgain - Feature #2336: Make reflectometry computation as fast ...		Resolved	04 Apr 2019

History

#1 - 20 Nov 2019 14:32 - dmitry

- Related to Refactoring #2343: Improve performance in reflectometry engine added

#2 - 20 Nov 2019 14:36 - dmitry

- Related to Feature #2336: Make reflectometry computation as fast as in Refnx added

#3 - 06 Apr 2020 10:23 - pospelov

- Target version deleted (v2.0)

#4 - 06 Apr 2020 11:42 - pospelov

- Status changed from Backlog to Sprint

- Target version set to Sprint 43

#5 - 17 Jun 2020 12:57 - pospelov

- Status changed from Sprint to Backlog

- Target version deleted (Sprint 43)

#6 - 18 Sep 2020 20:01 - wuttke

- Subject changed from Speeding up computations on samples with a large number of layers to Core: beam propagation: Speeding up computations on samples with a large number of layers

#7 - 18 Sep 2020 20:03 - wuttke

- Assignee set to *rbeerwerth*

Randolf: May be you should reinvestigate this in connection with your current work on beam propagation.