

## BornAgain - Feature #2433

### Parameterization: investigate multi-threaded performance in the case of parameter distribution.

06 Apr 2020 11:00 - pospelov

<b>Status:</b>	Backlog	<b>Start date:</b>	06 Apr 2020
<b>Priority:</b>	Normal	<b>Due date:</b>	
<b>Assignee:</b>		<b>% Done:</b>	0%
<b>Category:</b>		<b>Estimated time:</b>	0.00 hour
<b>Target version:</b>			
<b>Description</b>			
See discussion at <a href="https://github.com/scgmlz/BornAgain/issues/914">https://github.com/scgmlz/BornAgain/issues/914</a>			

#### History

##### #1 - 06 Apr 2020 11:45 - pospelov

- Assignee set to pospelov

##### #2 - 11 Apr 2020 12:40 - pospelov

I have created the first pull request for better performance in a multi-thread environment <https://github.com/scgmlz/BornAgain/pull/920>. It contains a functional test, some performance improvements, and results of performance measurements.

For the moment, it is not clear what causes huge performance degradation in the "Simple sample, small detector" scenario. It is especially noticeable when we switch from single thread to two threads (see comments to pull request). "Calgrind" and "gperf" in Qt-creator do not show anything suspicious.

My only explanation is that caching of specular coefficients (which can take up to 30% of whole CPU time) is starting to play a dominating role in the case of multiple threads when the sample itself is simple.

Here is the list of possible improvements:

- Make specular coefficients cache a common pool for all threads (with corresponding mutexes everywhere).

Or at least profile 1 .vs. 2 threads with caching disabled.

- Move simulation "normalize" inside the thread.
- Make SimulationElement relying on "const IPixel\*" instead of "unique\_ptr" to avoid costly IPixel::clone.

The difficulty here is Monte-Carlo integration and existence of SimulationElement::SimulationElement(const SimulationElement &other, double x, double y) constructor.

**#3 - 09 Jun 2020 13:00 - pospelov**

- Status changed from Sprint to Backlog
- Assignee deleted (pospelov)
- Target version deleted (Sprint 43)

**#4 - 18 Sep 2020 23:12 - wuttke**

- Subject changed from *Investigate multi-threaded performance in the case of parameter distribution.* to *Parameterization: investigate multi-threaded performance in the case of parameter distribution.*