

Improving g-2 performance to be in line with the Technical Design Report

The design muon storage rate of 112k per second was based on simulations done at the time of TDR publication. Improvements in the simulations since that time suggest that for the baseline design of the experiment, there would only be 80% of that number or 90k stored muons/second. At the time of the 2018 summer shutdown, the maximum rate of 59k stored muons/sec had been achieved. Improving known performance issues in the 2018 shutdown should lead to a 44% improvement over current performance or 85K stored muons/sec. Improvement from the baseline design in both the accelerator and experiment should lead to a 68% improvement in storage rate, or 143K stored muons/sec.

	improvement	muons/sec * 1000
Achieved muon storage rate (1000 muons/sec)		59
Improvements of existing equipment in base design of experiment		
Thinner vacuum window at end of beam line	4%	61.4
Storage ring kicker amplitude increase	10%	67.5
Storage ring kicker waveform improvement	15%	77.6
Storage ring quadrupole voltage increase	10%	85.4
Sum of base improvements	44%	85.4
Upgrades beyond the base design of experiment		
Ionization cooling wedges	20%	102.5
* Open ended inflector	40%	143.4
** Disk shaped production target	5%	143.4
Sum of planned upgrades	68%	143.4
Total planned increase in stored muon rate	142%	143.4

* open ended inflector is scheduled for installation during 2019 shutdown.

** Disk shaped target will be a prototype target to be installed at a future date. It is not clear if this target can be run at operational proton flux so the calculated increase is not included in the calculated total gains.