

# Stretcher Ring for the Main Injector

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A proposal was made at Breckenridge for an upgrade to the standard Phase II Upgrade. It was proposed to add a stretcher ring in the main injector tunnel to improve the spill duty cycle for main injector fixed target physicists. This stretcher ring would be a second synchrotron in the main injector tunnel which would be operated DC at the fixed target operating energy (nominally 120 GeV). The main injector would accelerate beam intended for fixed target experiments just as in the standard upgrade design. However, instead of having a slow spill from the main injector, the beam would be transferred to this stretcher ring and slow spilled from there for the entire main injector cycle. This has the advantage of nearly 100% slow spill duty factor and, by removing the 1 second slow spill period from the main injector cycle, increases the number of protons available per day by 50%. The major beneficiary of this would be the kaon experiments which need enormous numbers of events and so need all the spill seconds and protons they can get.

A very rough cost estimate (guess) came to \$40M for equipment. It should be possible to design such a machine so that it fits into the main injector tunnel and service buildings, so no additional construction would be needed. Since this machine would only have to ramp as so more turns of copper could be added. (The inductance doesn't matter.) These modifications to the main injector dipole design yield a machine that would require 6MW to power DC at 120 GeV. Note that one saves 4.4 MW from the main injector cycle by removing the one second slow spill from that machine. Some additional power would also be needed for DC operation for the beam line to the experimental area.

Some consideration should be given as to whether such a machine is worth its cost, since, if it is built eventually, minor increases in the main injector utilities in the initial construction might be desirable.

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