

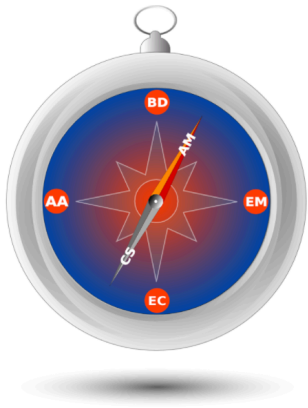


ComPASS Update

James Amundson

All Experimenters' Meeting/Lab Status Meeting

September 25, 2017



The ComPASS Project

High Performance Computing for Accelerator Design and Optimization

Community Project for Accelerator Science and Simulation

- Collaboration of accelerator physicists, applied mathematicians and computer scientists
- Beam dynamics with collective effects and advanced accelerators
 - through high performance computing
- At Fermilab since ca. 2000
 - Significant simulation efforts in Booster, Muon Delivery Ring, Main Injector, Recycler
 - and even Tevatron

SciDAC

- ComPASS is (and has been) funded by DOE SciDAC, <http://www.scidac.gov/>
 - Scientific Discovery through Advanced Computing
- SciDAC4 call went out Spring 2017
 - Joint HEP/ASCR funding
 - ASCR: Advanced Scientific Computing Research
- **ComPASS4** collaboration and proposal led by Fermilab
 - Collaboration between **Fermilab**, **UCLA**, **ANL** and **UCLA**
 - I am project coordinator
 - Beam Dynamics: **Fermilab**
 - Plasma-based Acceleration: **UCLA**
 - Parameter Optimization: **ANL**
 - Solvers: **LBL**



Proposal Process and Results

- ComPASS4 was awarded \$8M over 5 years
 - Fermilab leads 3 SciDAC4 projects, including the two largest, and participates in a fourth
- Official notification on September 13



SciDAC-4 Partnerships Status (April 2017)

Partner	Collaborations (proposals)	Closed (open)	Panel Review	Reviewers (reviews)	Requested (\$=\$1000)	Max. Available* (\$=\$1000)
NP Barnes	7 (51)	24 Feb. (10 Nov.)	3 April	12 (24)	\$53,612	\$25,000
HEP ¹ Chatterjee	14 (14)	27 Feb. (4 Nov.)	7 April	32 (73)	\$75,042	\$25,000
FES Mandrekas	17 (96)	21 Feb. (16 Nov.)	19-21 April	47 (126)	\$201,596	\$90,000
BER ² Koch	30 (98)	15 Mar. (4 Nov.)	3-4 May	49 (170)	\$120,695	\$50,800
NE ³ Funk	5 (12)	5 April (16 Dec.)	mail-in only	TBD	\$28,492	\$7,500
TOTAL	73 (271)				\$479,437	\$198,300

From Barbara Helland's 04/2017 presentation to the Advanced Scientific Computing Advisory Committee

ComPASS4 Objectives

- Physics
 - Beam dynamics (Synergia)
 - Simulation support for PIP-II
 - including all relevant portions of the Fermilab complex
 - Simulation support for IOTA
 - Plasma-based acceleration (QuickPIC and Osiris)
 - Simulation support for FACET-II
- Enabling tools
 - Synergia combined with MARS
 - Accelerator simulations including losses and radiation transport
 - Advanced Solvers
 - More advanced boundary conditions
 - Higher accuracy
 - Parameter optimization system
 - Take advantage of both high-performance computing and high-performance computer science/(applied math)
 - Full plasma-based accelerator simulation (QuickPIC + Synergia)

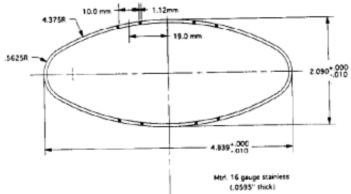


Figure 7: Engineering drawing of the Fermilab Main Injector beam pipe. The cross section is nearly elliptical.

