Meson Production for IDS120h Configuration with MARS15(2012) and Multiprocessing

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Target Studies

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Introduction

- New code of MARS15 (2012) was recently installed to replace MARS15 (2010) due to BNL Cluster's enhancement.
- However, the newest code is slower per one history because of substantially extended physics models and more sophisticated algorithms that now result in lesser fluctuations and give better smoother results with a lesser number of histories.

  (Comment from N. V. Mokhov)

  (about 10 times slower according to my running test)

Introduction (Cont'd)

- A parallel processing option has been developed and implemented into MARS15. Parallelization (multiprocessing) is job-based, i.e. the processes, replicating the same geometry of the setup studied, run independently with different initial seeds. So for requirement of high number of incidents (primary events), we can run multiple MARS15 (2012) jobs.

Running Multiple MARS15(2012) Jobs

MARS15 version	2010	2012
Target radius/cm	0.404	0.404
Beam radius/cm	0.1212	0.1212
Crossing Angle/mrad	20.6	20.6
Beam angle/mrad	117	117
Jet angle/mrad	137.6	137.6
Meson production (400000 events)	129864 (±1019)	
Meson production (40*10000 events)		129086 (±1018) (-0.6%)
Meson production (8*50000 events)		130488 (±1024) (+0.48%)