# Multiprocessing/MARS15(2012)/Princeton Cluster (IDS120j w/t Resistive Magnets: New Hg Module)

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# Multiprocessing
# (Motivation)

Key Points in Nicholas Souchlas's talk
(https://pubweb.bnl.gov/~kirk/Target_Studies/2013_03_28/IDS120j_NEW_Hg_MODULE_m1510_VS_m1512.pdf)

**1.  IDS120j  GEOMETRY, NO RESISTIVE MAGNETS:  WITH 20 cm GAPS  BETWEEN  CRYOSTATS.**

**2.  SIMULATIONS CODE: mars1510 (Desktop)/ mars1512 (Princeton Cluster).**
**mars1510: 1E5 ~ 7.72 hrs, [5E5 ~ 38.33 hrs]**
**mars1512: 1E5 ~ 111.06 hrs, [5E5 ~ 555.3 hrs ( 23.6 d ) !!! ( ESTIM)]**

Explanation (http://physics.princeton.edu/mumu/target/Ding/ding_020713.pdf):
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 of m1512 vs. m1510)

# Multiprocessing (Cont'd)

**3. High TDPD (mW/g) is given by mars1512 (1E5) then m1510 (5E5).**

**mars1510: ~ 0.07 mW / g AT ( r, z, phi) = (125 cm, 35 cm, 225 deg) IN SC#1 [ 4 x 5E5 EVENTS ]**

**mars1512: ~ 0.19 mW / g AT ( r, z, phi) = (125 cm, 115 cm, 255 deg) IN SC#2 [ 1E5 EVENTS ]**

**A multiprocessing option has been developed and implemented into MARS15 (2012) by N.V. Mokhov. 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.**

# Multiprocessing
## (Setting & Simulation)

Setting & Running with 100 jobs (50,000 events for each)

Setting at /mnt/dayabay/dayabay/nsouchlas/INRNHMWDSSS (_100) (100 jobs) or /mnt/dayabay/dayabay/ding/mars1512/ED (100 jobs)

All running of 100 jobs are finished in INRNHMWDSSS directory (each job took almost 100 CPU hrs). Nicholas will analysis the results.