

1MCNPX™ Overview

- History of the code
- Code Releases and Beta Test Program
- Downloading and Compiling
- Future Plans
- Warnings

MCNPX™ is a Trademark of the Regents of the University of California, Los Alamos National Laboratory.

These commodities, technology or software were exported from the United States in accordance with the Export Administration Regulations. Diversion contrary to U. S. Law is prohibited.

Contributors

Code Development Team

Joe W. Durkee, Harry W. Egdorf, Franz Gallmeier, John S. Hendricks, H. Grady Hughes, Robert C. Little, Gregg W. McKinney, Richard E. Prael, Teresa L. Roberts, Edward C. Snow, Holly L. Trellue, Laurie S. Waters, Morgan C. White

Library Development Team

Mark B. Chadwick, Stephanie C. Frankle, Gerald M. Hale, Robert C. Little, Robert MacFarlane, Morgan C. White, Phillip G. Young

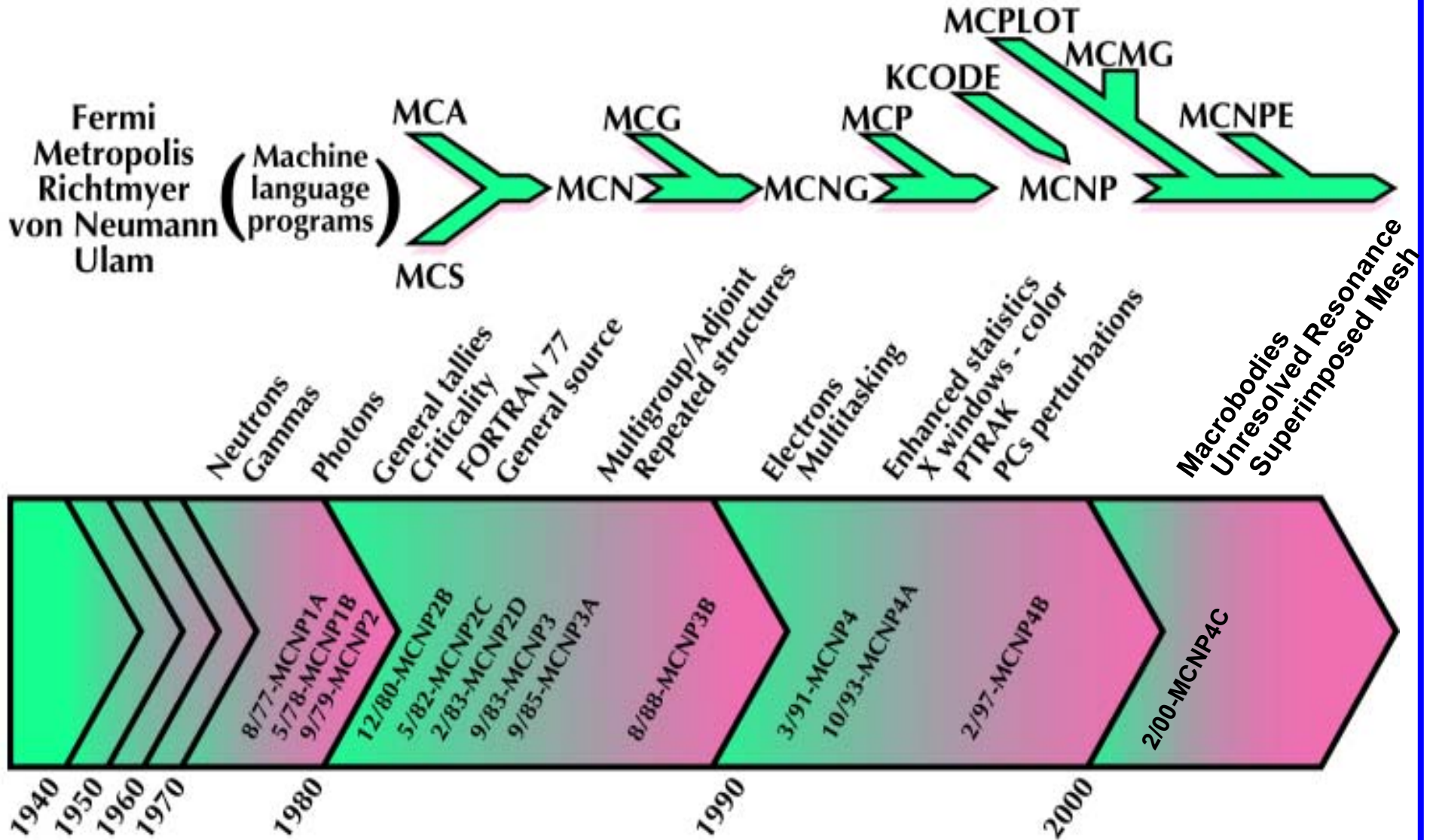
Physics Development Team

Julian Lenenhardt, David G. Madland, Stepan Mashnik, Richard E. Prael, Arnold J. Sierk

APT Target/Blanket Design and ED&D Team

Michael W. Cappiello, Rhonda K. Corzine, Frank Dietrich, Phillip D. Ferguson, Michael M. Fikani, Frank D. Gac, William B. Hamilton, Michael R. James, Russell Kidman, Nick King, Paul Lisowski, Stuart A. Maloy, Douglas R. Mayo, George L. Morgan, Michael A. Paciotti, Eric J. Pitcher, Lawrence G. Quintana, Gary J. Russell, Martin T. Swinhae, Stephen J. Tobin

HISTORY OF MCNP DEVELOPMENT



History of MCNPX

MCNPX extends MCNP to all particles and energies.

- 34 particles can be tracked
- new 150 MeV libraries added for neutrons, protons, photonuclear
- Physics modules calculate interactions above tabular data and where data tables are unavailable.
- New source, tallying and variance reduction options

MCNPX Code Releases

1992-1993 LAHET and Superhet

Superconducting Super Collider

1994-1995 Start of the APT program

Version 1.0

April 22, 1997

Version 2.0

October 1, 1997

Version 2.1.3

April 17, 1998

HISTP writing, compatible with HTAPE, collisional energy loss model

Version 2.1.4

July 24, 1998

Mesh & radiography tallies, gridconv, bertin & phtlib binary support

Version 2.1.5*

Nov 14, 1999

CEM, HTAPE3X, User's Manual, Beta test team

Version 2.1.6

September 14, 1999

Proton libraries (internal user only)

Version 2.3.0*

April 27, 2002

Version 2.4.0*

August 01, 2002

update to MCNP4C3, F90, Windows PC, Update User's manual

Version 2.5.c

April, 2003

MPI Multiprocessing, Mix & Match, CEM2k

Version 2.5.d

August, 2003

INCL4/ABLA physics models, multiple particles on SDEF card, READ card, etc.

Version 2.5.e

February, 2004

MPI KCODE speedup, 64-bit integers, G5 support, 2-D color contour plots, etc.

Version 2.5.0

~May, 2004

Releases to RSICC

<http://epicws.epm.ornl.gov/rsic.html>

Use ì codes and dataî to order the code at RSICC (C00705)
version 2.4.0 is currently available. This is an F-90 version
based on MCNP4C3,

Use this site to order MCNPX data libraries (DLC205)
includes LA150n libraries of 42 isotopes

<http://www-rsicc.ornl.gov/Servers/MCNPX/links.html>

Beta Test Team Usage by Group

Application	Groups	Percent
Medical (BNCT, proton therapy)	50	15.11%
Spacecraft, Cosmic Rays, SEE, propulsion	42	12.69%
Detectors, experiments, Threat Reduction	39	11.78%
ATW, ADS, Energy Amplifiers	37	11.18%
Fuel cycles, beginning to end, including storage	32	9.67%
Accelerator Shielding and Health Physics	28	8.46%
Theoretical Physics	23	6.95%
Neutron Production for Scattering	21	6.34%

MCNPX Workshops

Application	Groups	Percent
Isotope Production	14	4.23%
Radiography	12	3.63%
MCNPX/MCNP code development	11	3.32%
Materials studies (IFMIF)	6	1.81%
Radioactive Ion Beams	5	1.51%
Irradiation Facilities	4	1.21%
Neutrino Targets	4	1.21%
Light Sources, electron machines	3	0.91%

Downloading And Compiling

- Version 2.5.d will be demonstrated at this class.
- MCNPX is supported on UNIX, Linux, PC Windows
- <http://mcnpx.lanl.gov>, Beta Test Page
- Autoconfiguration Procedure

Instructions are given for system-wide and private installation
We recommend 'Individual Private Installation Done Better'
section

GNU make, version 3.76 or higher

GNU m4, preferably version 1.4

GNU autoconf, preferably version 2.13

GNU find, preferably version 4.1

MCNPX Workshops

```
# go to your user home directory
cd /home/me/
# unpack the distribution that was copied from the net or a
CDROM.
# This creates /home/me/mcnp_x_2.5.d
gzip -dc mcnp_x_2.5.d.tar.gz | tar xf -
# make a local directory for a build directory. Call it 'mcnp_x'.
mkdir mcnp_x
# go into that new empty working space
cd mcnp_x
# execute the configure script
# the --prefix tells where to put the executables and libraries.
../mcnp_x_2.5.d/configure --prefix=/home/me
# now make the executable mcnp_x program and the bertin and pht
libraries,
# run the tests,
# and install in /home/me/bin and /home/me/lib
make all tests install
```

Platforms Supported

- **Unix**
 - Sun
 - SGI
 - IBM
 - DEC
 - HP
- **Linux**
 - Sun
 - DEC
 - PC
- **Windows**
 - 9X, NT, 2K, XP
- **Apple**
 - MacIntosh G5 (NAG & IBM compilers)

Future Plans

Component-Based Architecture

- Allows addition of modules which can be maintained by separate developers.
- Allows selection of different options upon compilation.
- Allows independence of programming language.
- Interface Definition Language is critical

--with-OLDXS

compiles the 2.1.5 version of high energy elastic/
reaction cross sections

Planned Capabilities

- Heavy ion tracking and interaction physics
- CAD interface
- Weight windows extended to physics region
- Forced collisions for neutral particles extended above libraries
- Secondary particle angle biasing for isotropic distribution
- Point detectors/dxtran for neutrons in model region
- Pulse height tallies with variance reduction
- Neutral particle perturbation techniques extended to physics region
- New 150 MeV actinide libraries
- Plot model total, absorption and slowing down cross sections
- Improved photon/electron physics at high and low energies

Warnings

- ~~Next~~ Event Estimators work only in the tabular region, and not at all for charged particles.
- Perturbation methods have not been extended to high energy modules yet.
- Version of FLUKA in the code is rather old.
- PTRAC capability has not been extended to high energy modules. HTAPE capability does not include tabular data.