

# DMC Simulations Status

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DMC Meeting

# Overview

1. Software Development
  - a. DMC Packages and Workflow
  - b. Matlab DMC for V1.1 DMC Data is Ready
2. Production Status of the Simulations
  - a. Last of 1.0 simulations updates
  - b. Suggested priorities for 1.1
3. Bookkeeping and SuperCDMS Catalog
4. Conclusions

# DMC Packages and Workflow

Order	Step	Status	Who	Current Package	Final Package
1	Supersim	Working, being upgraded	MK	SuperSim	SuperSim
2	DMC First (makes e, holes, and phonons)	Matlab working but debugging, G4DMC in progress	JSW/RA+MK	Matlab DMC/G4DMC	Matlab DMC/G4DMC
3	TES Saturation Simulation (Bulldozing)	Using, but still don't know why this isn't simulated correctly. Done correctly in G4DMC?	JM	TESSsim	Matlab DMC/G4DMC
4	Final DMC Steps (makes TES)	Matlab working but debugging, G4DMC in progress	JSW/RA+MK	Matlab DMC/G4DMC	Matlab DMC/G4DMC
5	Calibrations	Working, but debugging	JM	Preprocessing	DMC
6	Noise	Using	JM	CDMSBats (currently step 7)	DMC
7	Formatting for CDMSBats	Using Root version/Binary Writer (Binary writer in construction)	JM/KC	Preprocessing (currently step 6)	DMC
8	CDMSBats	Working		CDMSBats	CDMSBats

- Step 6 and 7 are swapped in the ROOT version, but correct for the binary
- Step 7: Formatting can't be done in Matlab DMC as is, because it combines multiple events/detectors per sample; that's what a CDMSBats input file looks like. It could be a single step in the future, but not streamlined with the per event generation scheme

# Corrected DMC bugs and Versioning

- DMC code v4.1 includes a number of changes since the previous release, v4.0.6, from February 2012:
  - energy conservation for holes and electrons
  - fix for mesh skimming bugs
  - phonon and QP original source information
  - reduced number of unnecessary copies of the potential mesh (and recomputations of its triangulation)
  - Noah's change to charge energy rounding
  - The beginning of the binary writer by Katrina
  - Some changes by Rob in 2013
  - A variety of changes made by Kevin and Adam in 2012
- DMC data v1.0 (code v4.0.6) is being stopped and we are now starting DMC data v1.1 (code v4.1).

# Generation of DMC Samples

- Generation of 1.0 is being stopped and 1.1 is beginning.
- LT and HT:
  - Plan: fully process 10 k events of each sample before making big versions of any source. Will alternate between LT and HT.
- CDMSLite:
  - Plan: fully process 10 k events of Ge 71, Cf, WIMP, and Ba each. After that will make bigger versions of these sources and will process any other sample upon request only. Gave CDMSLite 200,000 events of v1.0 data that had bulldozing applied.
- Simulations are listed on each page in the order prioritized. If you have a suggested change, let us know!
- Preprocessing and processing are ready and being implemented for LT and HT. There are a few updates in progress for CDMS Lite.

Production Status of the Simulations

Status: LT Simulations

(v1.1)

Color scheme for status:

Finalized: Completed, processed and merged in CDMSBats

CDMSBats: Preprocessing complete, CDMSBats next

Preprocessing: DMC complete, ready for preprocessing

DMC: Input existent, DMC events need to be generated

Simulation Type	Ndets	DMC Pulses Needed T2Z1	DMC Pulses Generated (V1.1)	Preprocessed (scale w/ calibration constants & format events, add noise)	CDMSBats (Data processing)	Status
Ba	7	10,000 cryo 10,000 vac	0	0	0	DMC generating now
Cf	7	10,000	0	0	0	DMC generating next
WIMP	7	10,000	0	0	0	
L-Shell Activation Lines	7	10,000	0	0	0	
Pb 206	7	10,000 sidewall 10,000 surface	0	0	0	
Pb 210	2	10,000 sidewall 10,000 surface	0	0	0	
Bi 210	2	10,000	0	0	0	

# Status: HT Simulations

(v1.0)

Simulation Type	Ndets	DMC Pulses Needed	DMC Pulses Generated (v1.0)	CDMSBats Processed Events	Status
Barium	15	27,000,000	5,100,000 ~200,000 bulldozed	~200,000 bulldozed	Now Stopped!
Activation Lines	15	525,000	✓	0	Now Stopped!
Pb206	15	1,471,000	✓	0	Now Stopped!
Pb210	15	1,686,000	✓	0	Now Stopped!
Bi210	15	1,464,000	✓	0	Now Stopped!

**\*Notes:** We have now stopped generating (processing, etc) these events to use the CPU for the more important samples, but we can go back if anyone makes a request.

If there are no more requests about this: **This is the last update of HT V1.0 !!**

# Status: HT Simulations

(v1.1)

Color scheme for status:

Finalized: Completed, processed and merged in CDMSBats

CDMSBats: Preprocessing complete, CDMSBats next

Preprocessing: DMC complete, ready for preprocessing

DMC: Input existent, DMC events need to be generated

Simulation Type	Ndets	DMC Pulses Needed	DMC Pulses Generated	Preprocessing (scale w/ calibration constants & format events, add noise)	CDMSBats (Data Processing)	Status
Barium	15	10,000 cryo 10,000 vacuum	0	0	0	DMC generating now
Activation Lines	15	10,000	0	0	0	DMC generating next
Pb206	15	10,000	0	0	0	
Pb210	15	10,000	0	0	0	
Bi210	15	10,000	0	0	0	



# Status: CDMSlite Simulations

(v1.0)

Simulation Type	Ndets or Subtypes	DMC Pulses Needed	DMC Pulses Generated (v1.0)	CDMSBats Processed Events	Status
Co60	5 towers + shielding	13,000	✓	0	Now stopped
Ba	1	20,000	0*	0	Now stopped
Cf	1	20,000	0*	0	Now stopped
WIMP	1	1,000,000	✓	0	Now stopped
Ga68	1	10,000	✓	0	Now stopped
Ge68	1	10,000	✓	0	Now stopped
Ge71 (old)	1	10,000	✓	0	Now stopped
Ge71	2	200,000	200,000	0	Now stopped
K40	5 towers + shielding	14,000	✓	0	Now stopped
Rn 222	Outer Edge	500	✓	0	Now stopped
Th232	5 towers + shielding	24,000	✓	0	Now stopped
U238	5 towers + shielding	15,000	✓	0	Now stopped
Zn65	1	10,000	✓	0	Now stopped

**\*Notes:** We have now stopped generating (processing, etc) these events.

If there are no more requests about this:

**This is the last update of these samples!!**

# Status: CDMSlite Simulations

(v1.1)

Color scheme for status:

- Finalized: Completed, processed and merged in CDMSBats
- CDMSBats: DMC complete, CDMSBats processing is missing
- Preprocessing: Preprocessing complete, CDMSBats next
- DMC: Input existent, DMC events need to be generated

Simulation Type	Ndets or Subtypes	DMC Pulses Needed	Preprocessing (scale w/ calibration constants & format events, add noise)	CDMSBats (Data Processing)	Status
Ge 71	2	100,000	0	0	DMC generating 10,000 now
Cf	1	10,000	0	0	DMC generating next
WIMP	1	10,000	0	0	
Ba	1	10,000 cryo 10,000 vac	0	0	
Ga68	1	Only if Requested	0	0	
Ge68	1	Only if Requested	0	0	
Co 60	5 towers + shielding	Only if Requested	0	0	
K40	5 towers + shielding	Only if Requested	0	0	
Rn 222	Outer Edge	Only if Requested	0	0	
Th232	5 towers + shielding	Only if Requested	0	0	
U238	5 towers + shielding	Only if Requested	0	0	
Zn65	1	Only if Requested	0	0	

# Bookkeeping and SuperCDMS Catalog

- No updates recently, we need to learn how to push new samples in, and actually use it to store the new data on-the-go.

Analysis	DMC Generation Complete	DMC Gen Stored* and in Database	CDMSBats Processed Complete	CDMSBats Proc Stored** and in Database	Status
LT (v.0.0)	✓	✓	✓	✓	<a href="#">In the Catalog!!</a>
LT (v.1.1)	Not yet	Not yet	Not yet	Not yet	Not all files have been generated / processed
HT (v1.0)	Stopped (as is)	Only if Requested	Only if Requested	Only if Requested	Not all files have been generated / processed
HT (v1.1)	Not yet	Not yet	Not yet	Not yet	Not all files have been generated / processed
CDMSlite (v1.0)	Stopped (as is)	Only if Requested	Only if Requested	Only if Requested	Not all files have been generated / processed
CDMSlite (v1.1)	Not yet	Not yet	Not yet	Not yet	Not all files have been generated / processed

\*DMC Gen Location:

SLAC rhel6-64: `/nfs/slac/g/cdms/u05/DetMC_data/CDMS_DMC_v4-1-4_20120604_v02`

\*\*DMC CDMSBats Proc Location:

SLAC rhel6-64: `/nfs/slac/g/cdms/u05/DMC_dataRelease/CDMS_DMC_v4-1-4_20120604_v02`

See the LT Data in the Catalog here: <http://srs.slac.stanford.edu/DataCatalog/folder.jsp?folder=15261989>

Full Catalog link: <http://srs.slac.stanford.edu/DataCatalog/?experiment=CDMS>

# Conclusions

- **v1.0 set of DMC simulations:**
  - **DMC events already simulated:** ~10 million
  - **Simulated events CDMSBats processed:** 3 million (~1.8 million are HT Ba)
- **Current full set of DMC simulations:**
  - **List of DMC events to be generated:** 860,000 additional TBD
  - **DMC events already simulated:** 0
  - **Simulated events CDMSBats processed:** 0
  - **Currently simulating:** CDMSlite Ge71 T2Z1
  - **Next simulation task:** HT Ba T2Z1, LT Ba T2Z1
  - **Currently CDMSBats Processing:** CDMSlite Ge71 T2Z1
  - **Next CDMSBats Processing Task:** CDMSlite Ge71 T2Z1
  - **A bigger sample of HT Ba is being TESS simulated for DMC Calibrations**
- v1.0 simulations being stopped, v1.1 simulations starting w/ updated code v4.1
- We will only add the v1.0 DMC generated samples to the catalog if there is a specific request for that sample.