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Nu/DM meeting
28 June 2018

- FLUKA requires updated gfortran on neut computers
- BdNMC default runs ok, but burn-in timeout for SK
- SelectionPlots mode for neutrino flavour and energy cut (no update for Hiro)

FLUKA requires updated gfortran

- want FLUKA on neut computers
- neut19 is x86_64 with gfortran 4.4.7 and gcc 3.4.6
- first used in 2014, FLUKA required gfortran ≥ 4.6 so Dima setup on neut19 gfortran 4.7.2
- last updated to fluka2011.2c.5 in Feb 2017, gfortran requirement hadn't changed
- from Feb 2018 until now, fluka2011.2x releases and fluka2011.2c no longer available
- FLUKA requires gfortran ≥ 6.3 , urges gfortran ≥ 7 for future releases
- emailed Thomas

FLUKA download pages

GNU/Linux (i686 and x86_64)	requires gcc/g77 (version >= 3.4)
GNU/Linux (x86_64)	requires gcc/gfortran (version >= 6.3)
MAC/OS (x86_64)	requires gcc/gfortran (version >= 6.3)

The Linux x86 version must be compiled at 32 bits with g77 but can run on both 32 and 64 bit machines while the Linux x86_64 version must be compiled with gfortran and works only on 64 bits machine. The MAC/OS x86_64 version must be compiled with gfortran and works only on 64 bits machine. The latter is still tentative, we cannot exclude some issues with that version. The code has been checked and validated for these platforms/compilers only for the time being.

https://www.fluka.org/fluka.php?id=secured_intro

tried neut19(x86_64)
and neut15(i686)
→ gfortran >=4.8???

could try rpms?

could update my Mac?

gfortran 6.4
gfortran 8.1

could update my Mac?

gfortran 7.3

fluka2011.2x-linuxAA.tar.gz	FLUKA Package Version 2011.2x-3, G77	19th of June, 2018
fluka-2011.2x-3.i686.rpm	rpm for fluka-2011.2x-3	19th of June, 2018
fluka-2011.2x-3.x86_64.rpm	rpm for fluka-2011.2x-3	19th of June, 2018
fluka2011.2x-mac-gfor64bit-6.4-AA.tar.gz	fluka2011.2x-3 for Mac, gfortran 6.4	19th of June, 2018
fluka2011.2x-linux-gfor64bit-6.4-AA.tar.gz	FLUKA GFortran 6.4, 64 bits, Package Version 2011.2x-3	19th of June, 2018
fluka2011.2x-linux-gfor64bitAA.tar.gz	FLUKA GFortran 8.1, 64 bits, Package Version 2011.2x-3	19th of June, 2018
fluka2011.2x-mac-gfor64bitAA.tar.gz	fluka2011.2x-3 for Mac, gfortran 7.3	19th of June, 2018
fluka2011.2x-linux-gfor64bit-7.3-AA.tar.gz	fluka2011.2x-3, 64 bit, gfortran 7.3	19th of June, 2018

<https://www.fluka.org/fluka.php?id=download&sub=packages>

BdNMC default runs ok, but burn-in timeout for SK

- Rose's Aug 2017 report, Simulating light dark matter production at T2K and scattering at Super-Kamiokande
- ran default BdNMC 3.2.0 parameter.dat and used Rose's code to generate histograms
- no simple SK parameter.card from Rose so made my own, burn in timeout
 - reduced samplesize from 2000 to 500
 - use default max_trials, instead of Rose's 8e8
 - one production channel (pi0_decay), instead of three (pi0_decay, eta_eta, and V_decay)
 - changed to sanfordwang, instead of bmpt
 - is it still geometry? already SK scaled and efficiency reduced by 1000

SelectionPlots mode for neutrino flavour and energy cut

- many low energy ncqe events in current work, compared to 17Jan2016
- attached 20180625 slides

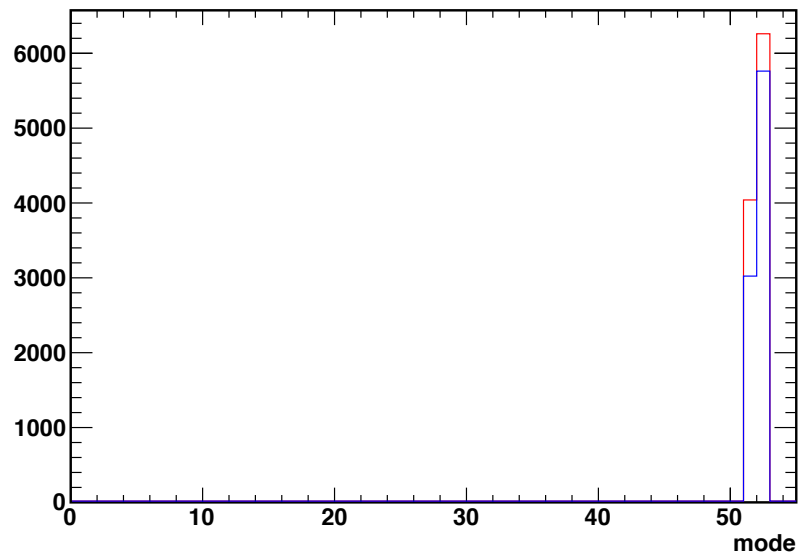
mode epass erec ≥ 4 . and < 30 .

current work

17Jan2016

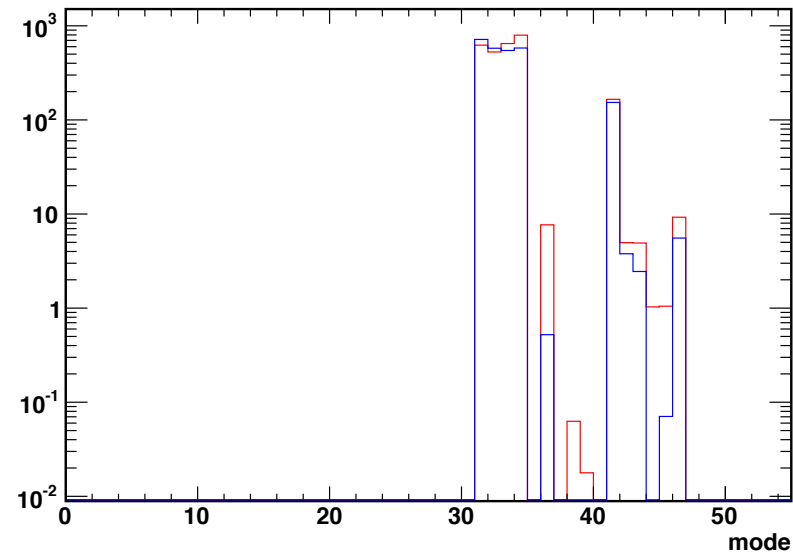
ncqe

ncqe mode epass



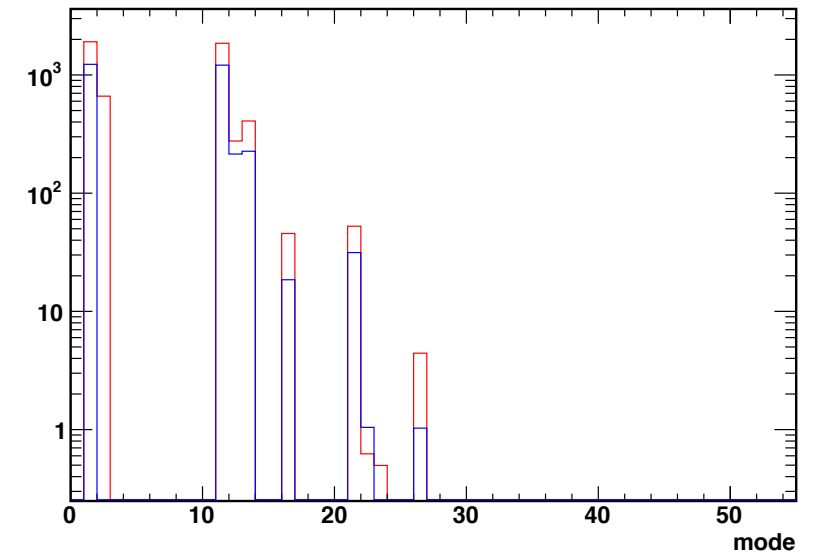
ncoth

ncoth mode epass



cc

cc mode epass



log

log

mode efail erec <4. or >=30.

current work

17Jan2016

ncqe

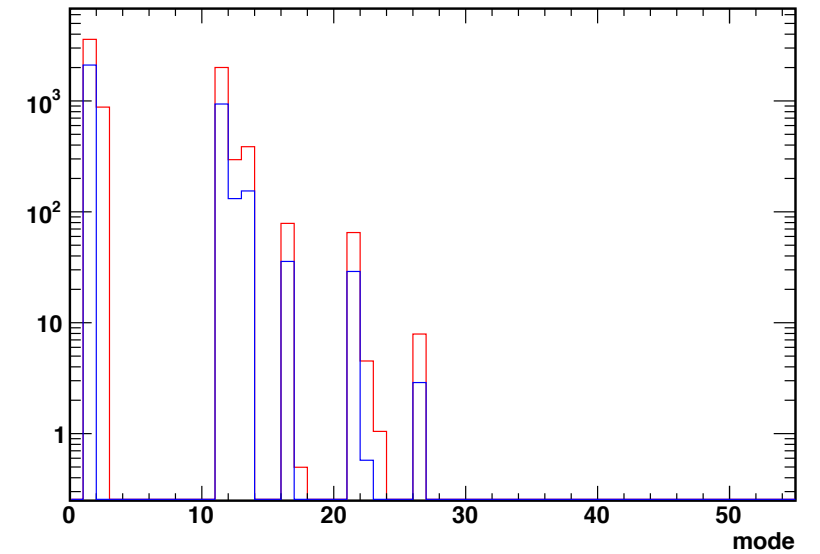
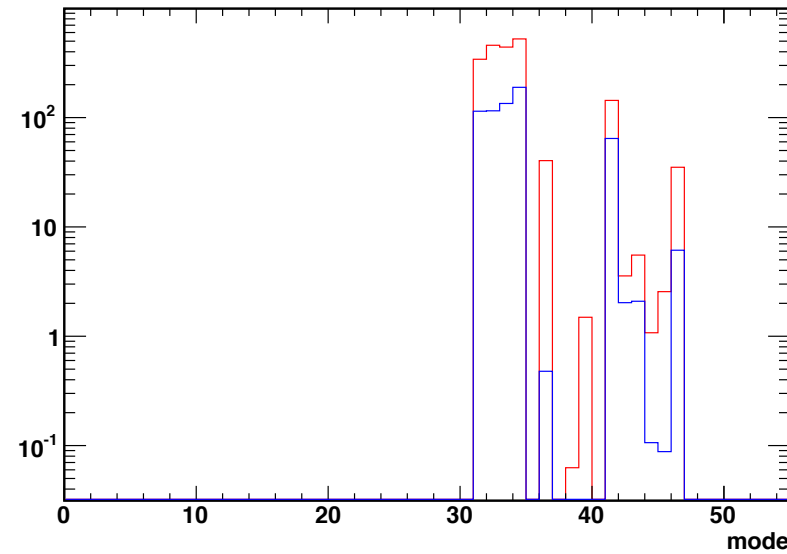
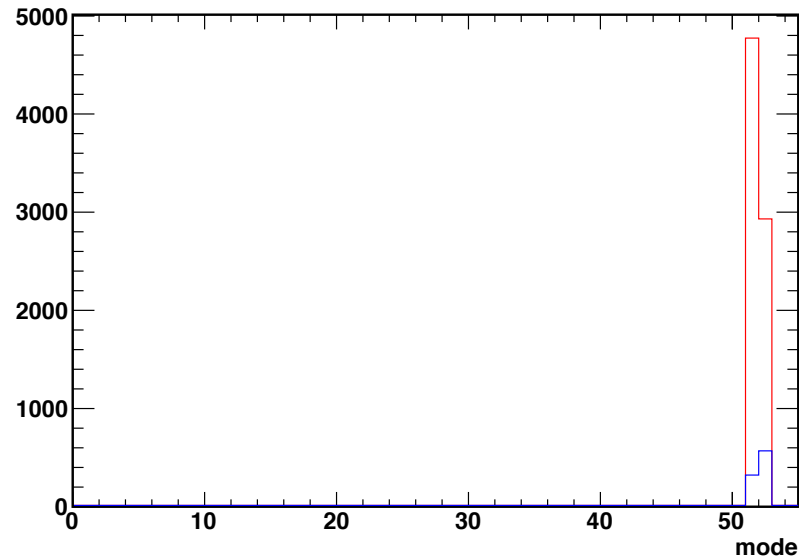
ncoth

cc

ncqe mode efail

ncoth mode efail

cc mode efail



log

log

As we determined yesterday, there are many low energy ncqe events in current work compared to 17Jan2016.

17Jan2016

hmode entries	all energy	epass	efail
all	84,716	66,976	17,740
ncqe	46,132	41,735	4,397
cc	16,422	7,784	8,638
ncoth	22,162	17,457	4,705

hmode integral	all energy	epass	efail
all	19,225.4	14,306.1	4,919.3
ncqe	9,676.2	8,784.8	891.4
cc	6,332.5	2,933.4	3,399.1
ncoth	3,216.7	2,587.9	628.9

current work

hmode entries	all energy	epass	efail
all	150,343	80,836	69,507
ncqe	89,773	51,411	38,362
cc	31,276	12,633	18,643
ncoth	29,294	16,792	12,502

hmode integral	all energy	epass	efail
all	35,320.2	18,301.9	17,018.3
ncqe	18,005.2	10,301.1	7,704.2
cc	12,527.2	5,212.6	7,314.6
ncoth	4,787.8	2,788.3	1,999.5

separate into num,nue,nmb

num

mode epass

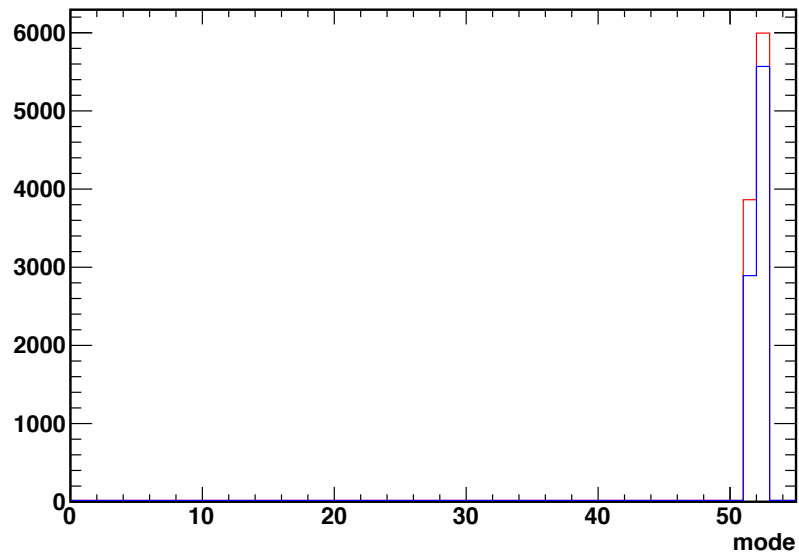
erec ≥ 4 . and < 30 .

current work

17Jan2016

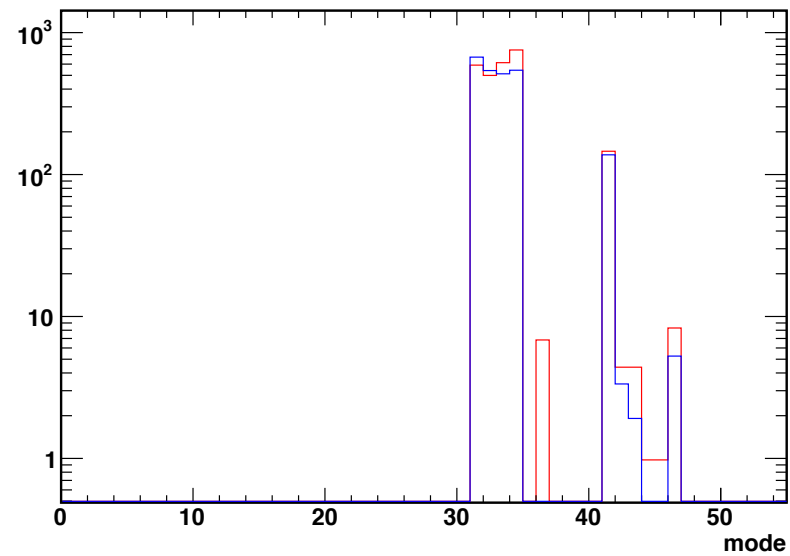
ncqe

ncqe mode epass num



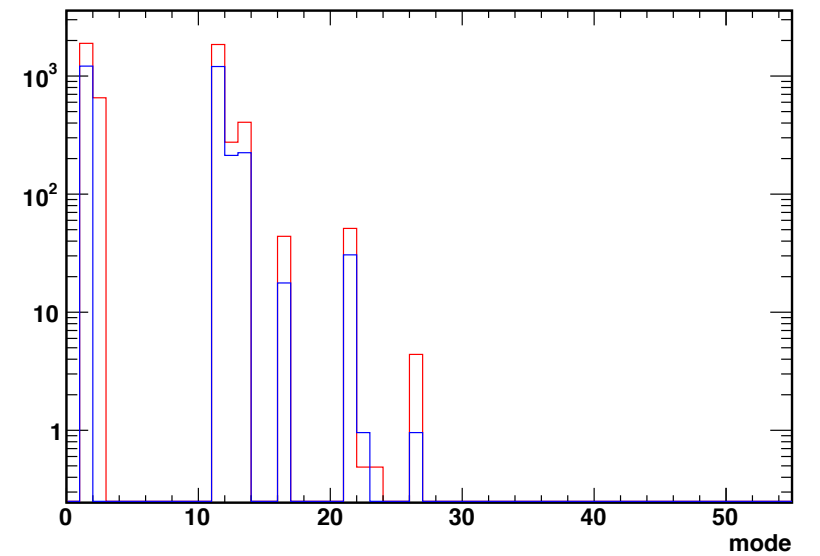
ncoth

ncoth mode epass num



cc

cc mode epass num



log

log

num

mode efail

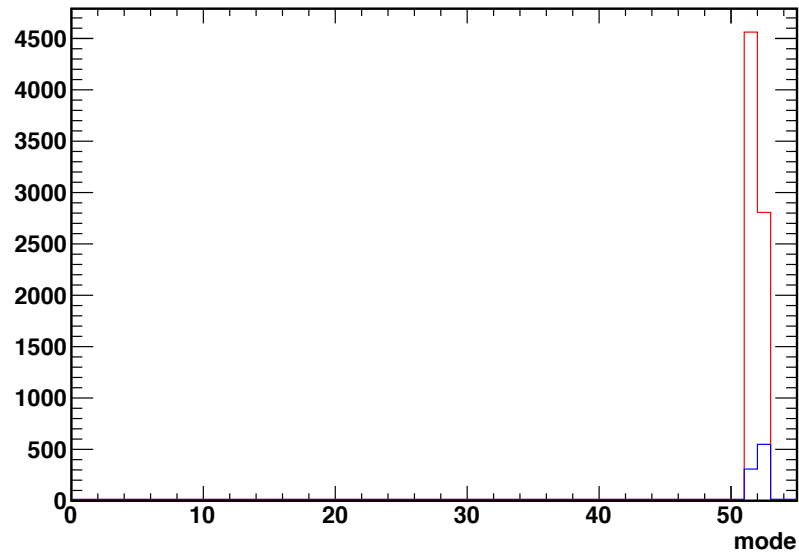
erec <4 . or ≥ 30 .

current work

17Jan2016

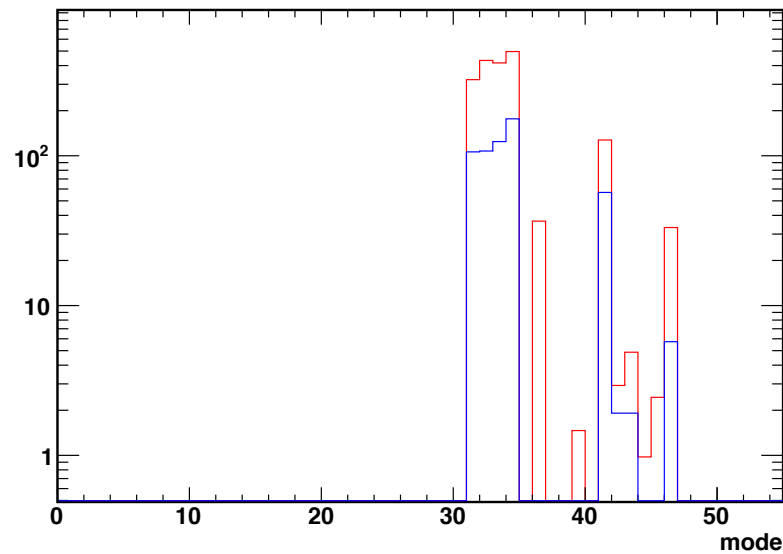
ncqe

ncqe mode efail num



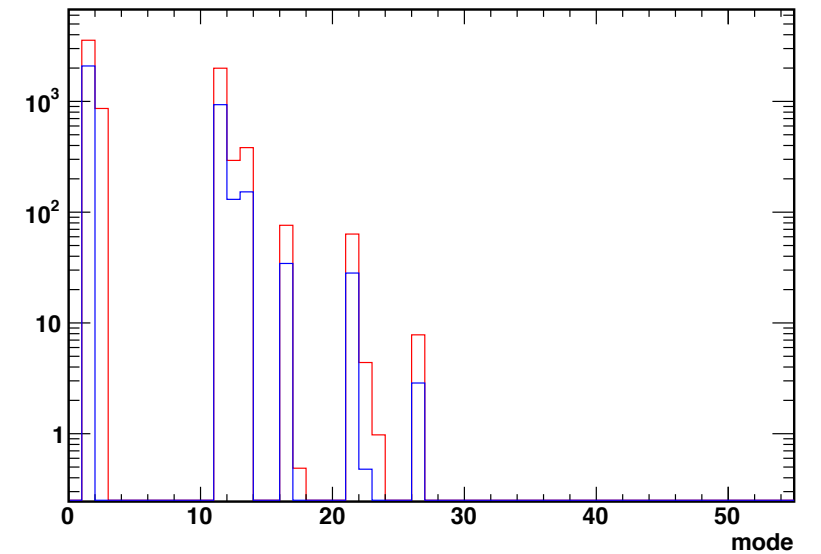
ncoth

ncoth mode efail num



cc

cc mode efail num



log

log

num events contribute to the many low energy ncqe events in current work compared to 17Jan2016.

nue

mode epass

erec ≥ 4 . and < 30 .

current work

17Jan2016

ncqe

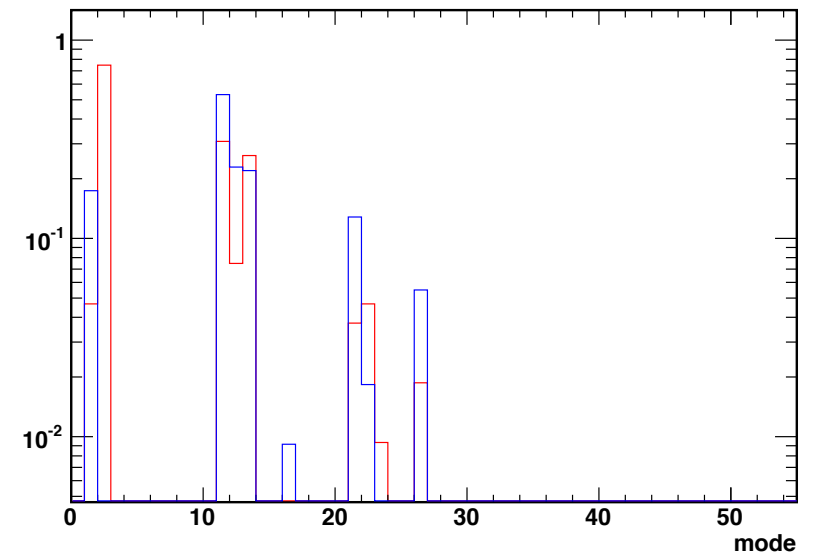
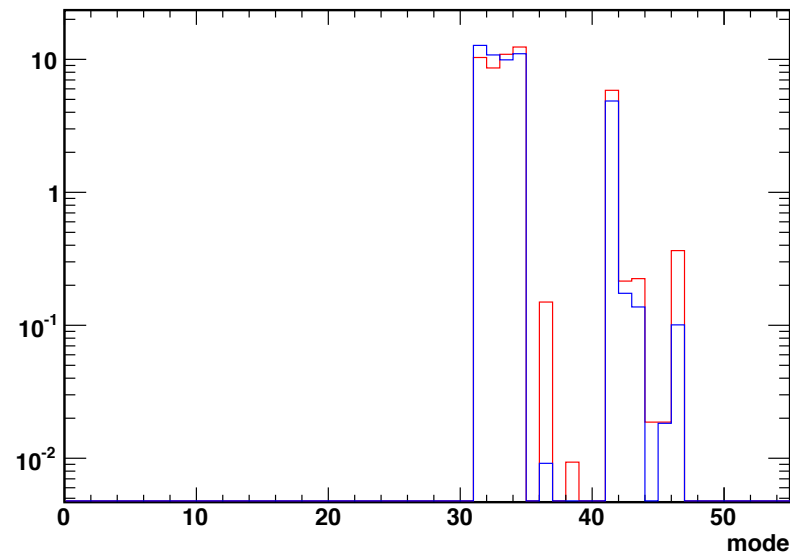
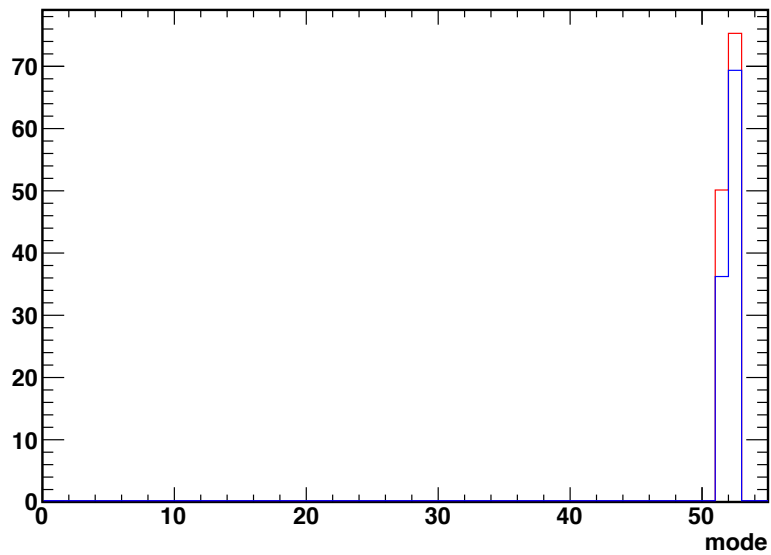
ncoth

cc

ncqe mode epass nue

ncoth mode epass nue

cc mode epass nue



log

log

nue

mode efail

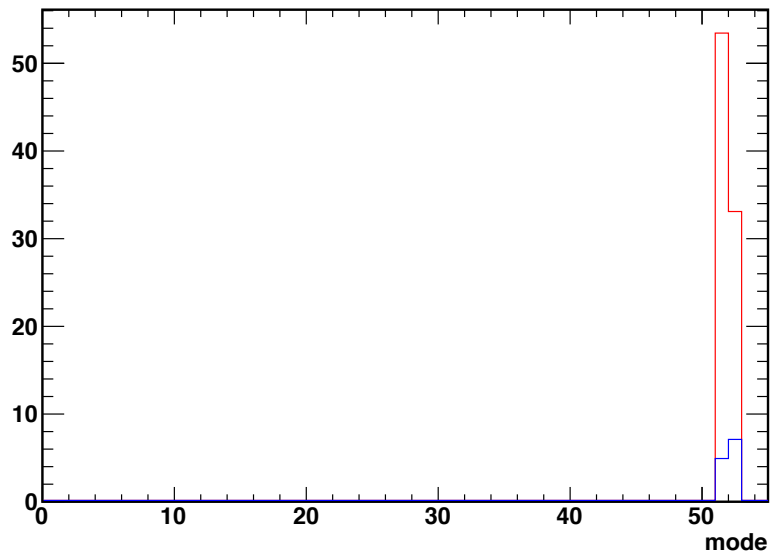
erec <4. or >=30.

current work

17Jan2016

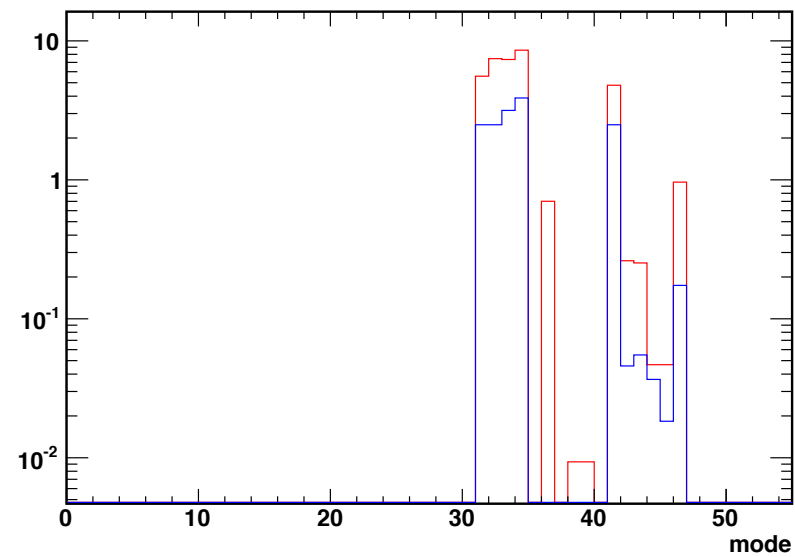
ncqe

ncqe mode efail nue



ncoth

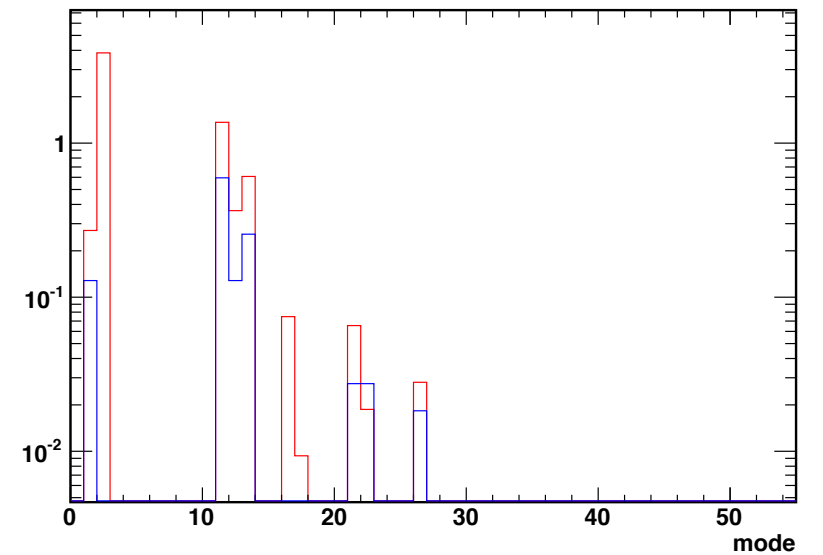
ncoth mode efail nue



log

cc

cc mode efail nue



log

nmb

mode epass

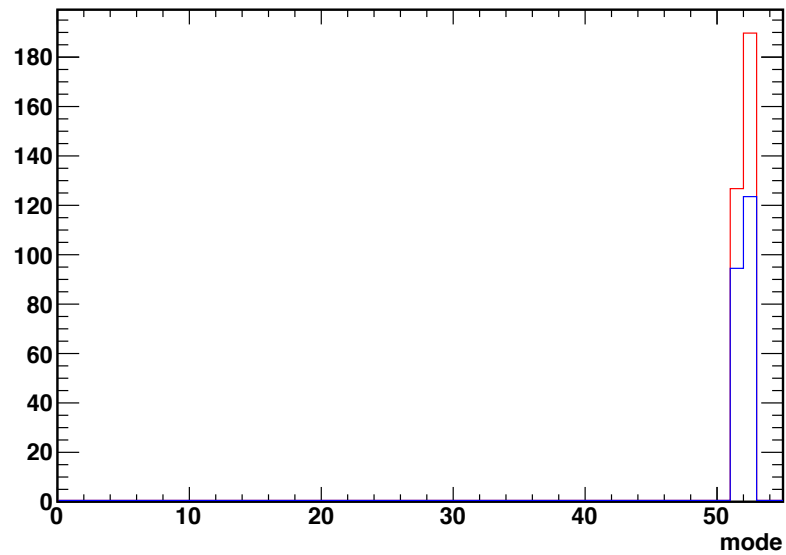
erec ≥ 4 . and < 30 .

current work

17Jan2016

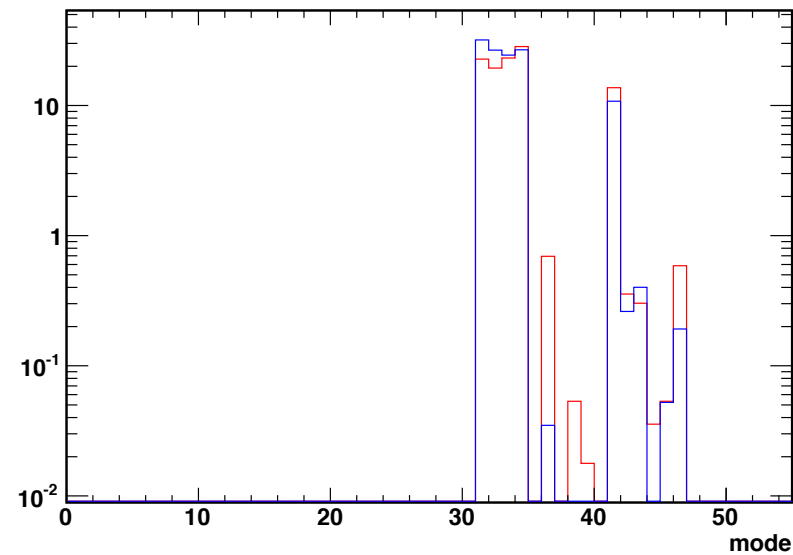
ncqe

ncqe mode epass nmb



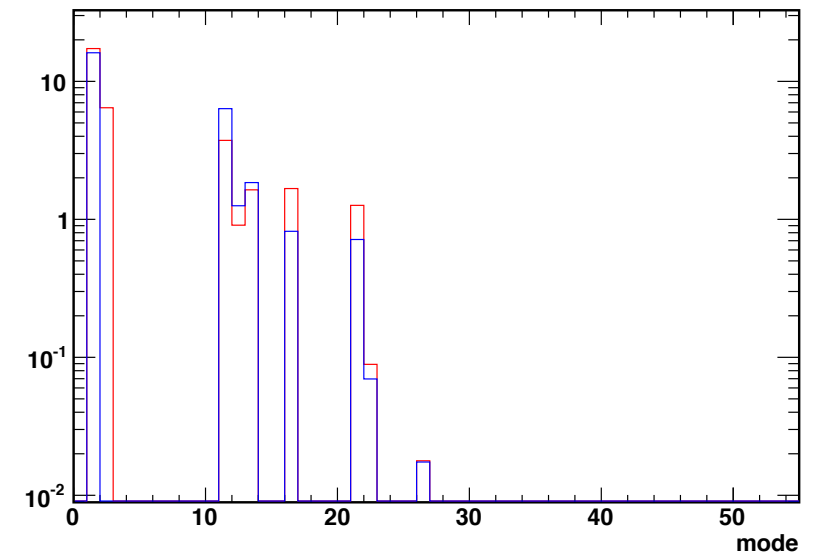
ncoth

ncoth mode epass nmb



cc

cc mode epass nmb



log

log

nmb

mode efail

erec <4 . or ≥ 30 .

current work

17Jan2016

ncqe

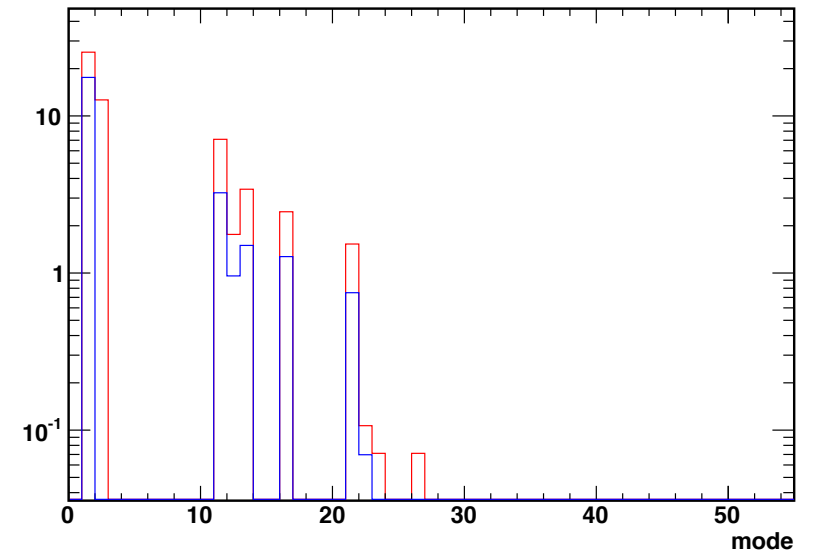
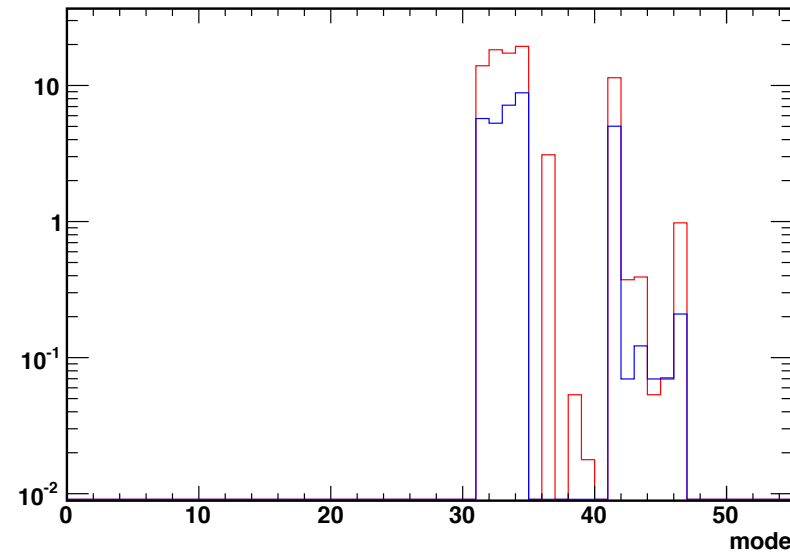
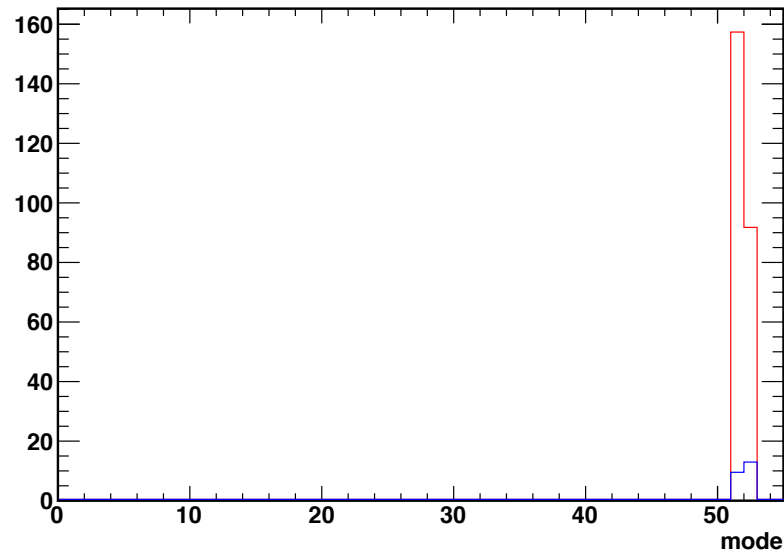
ncoth

cc

ncqe mode efail nmb

ncoth mode efail nmb

cc mode efail nmb



log

log

17Jan2016

num

hmode entries	epass	efail	total
all	28,824	10,061	38,885
ncqe	17,695	1,792	19,487
cc	6,075	7,053	13,128
ncoth	5,054	1,216	6,270

hmode integral	epass	efail	total
all	13,782.7	4,810.9	18,593.6
ncqe	8,461.2	856.9	9,318.1
cc	2,904.9	3,372.5	6,277.4
ncoth	2,416.7	581.5	2,998.2

didn't do all energy for flavour

17Jan2016

nue

hmode entries	epass	efail	total
all	17,115	3,064	20,179
ncqe	11,530	1,314	12,844
cc	149	129	278
ncoth	5,436	1,621	7,057

hmode integral	epass	efail	total
all	156.8	28.1	184.9
ncqe	105.6	12.0	117.6
cc	1.4	1.2	2.6
ncoth	49.8	14.8	64.6

didn't do all energy for flavour

17Jan2016

nmb

hmode entries	epass	efail	total
all	21,037	4,615	25,652
ncqe	12,510	1,291	2,542
cc	1,560	1,456	3016
ncoth	6,967	1,868	8,835

hmode integral	epass	efail	total
all	366.6	80.4	447.0
ncqe	218.0	22.5	240.5
cc	27.2	25.4	52.6
ncoth	121.4	32.6	154.0

didn't do all energy for flavour

17Jan2016

all flavours

hmode entries	total
all	84,716
ncqe	46,132
cc	16,422
ncoth	22,162

hmode integral	total
all	19,225.5
ncqe	9,676.2
cc	6,332.6
ncoth	3,216.8

didn't do all energy for flavour