Status of the ^{9}Be-EFF-3.0/NMOD=3 data processing with NJOY/ACER

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^{9}Be EFF3.0/NMOD=3

- **Recent evaluation by V.Pronyaev, S. Tagesen, H. Vonach (EFF-DOC-689)**
  - *Calculation and adjustment of neutron emission channels as partial (n,2n) cross sections*
  - *Including energy-angle distributions (and covariances)*
  - *16 channels for neutron emission, 17 for alpha emission*

^{9}Be EFF3.0/NMOD=3

- **ENDF-formatted data**
  - *Partial cross sections are given as MT875 to MT890*
  - *Energy-angle distributions are stored in subsections of MF6 for neutrons and alphas (LAW=7), multiplicity 2 is used explicitly*
  - *Included also the rather sharp neutron emission line of (n,n''x) as a separate distribution in MT876*
  - *The now redundant (n,2n)-cross section (MT16) is given as a full consistent sum of the individual channels*

Objective

- **Use of individual neutron emission channels in MC transport and sensitivity calculations**
- **ENDF-formatted data as given in MT875-890 (file 3 and 6) should be processing into a ACE-file for subsequent use in MCNP**
- **Present status of NJOY/RECONR and ACER does not allow to treat these data**

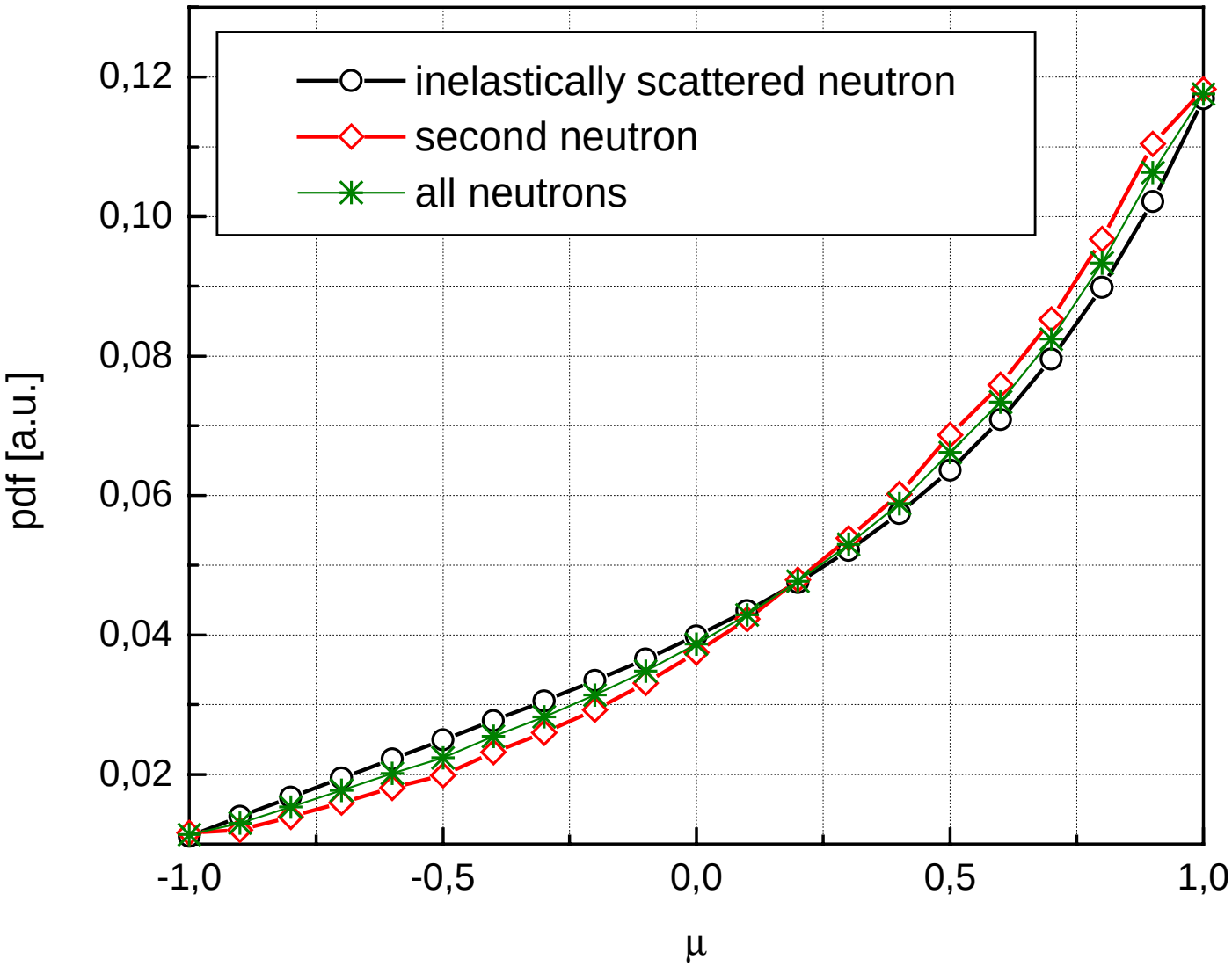
Processing with ACER

- **PENDF-output of RECONR added now by inclusion of MT875-890**
- **ACER dosimetry processing (only MT3 data) available by inclusion of MT875-890 in UNIONX**
- **ACER fast data processing (transport)**
  - *Allow for neutron emission and other particle emission in MT875-890*
  - *Increase ACE storage significantly*
  - *Allow for combining both neutron angular distributions in MT876 (option newfor=1 to use arbitrary cosine bins)*

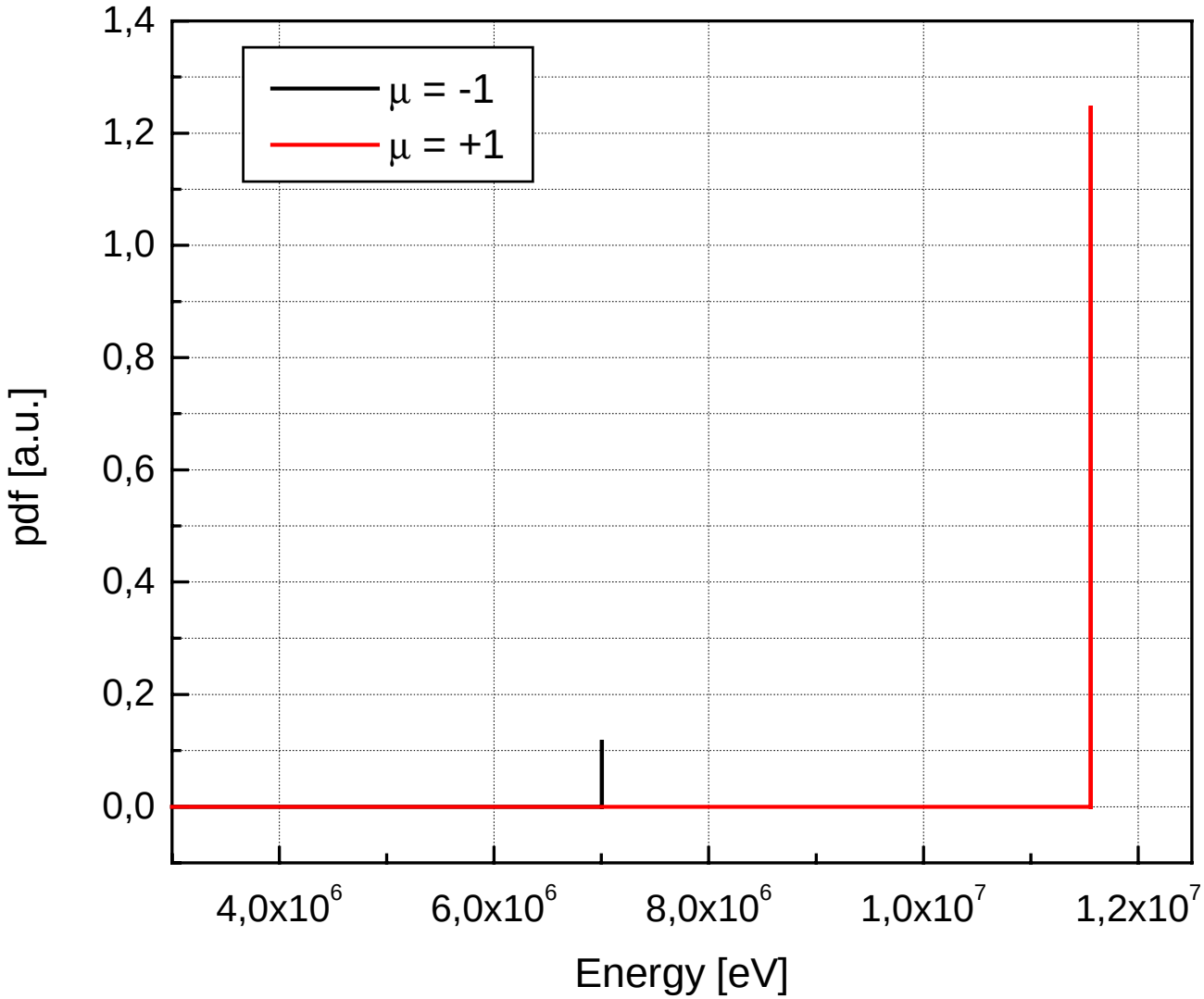
Processing with ACER

- **MT876: ^{9}Be(n,n''n2α)**
  - *2nd exited Level (2.43 MeV), Γ=770eV*
  - *Contributes between 50% at low energy and 20% at high energy to total neutron production cross section*
  - *Branches to ground state of ^{8}Be (7%) or three-body-break-up (93%)*
  - *Angular distributions of inelastically scattered neutron and of second neutron are given independently*
  - *ACE-format allows only single angular (but multiple energy) distributions*

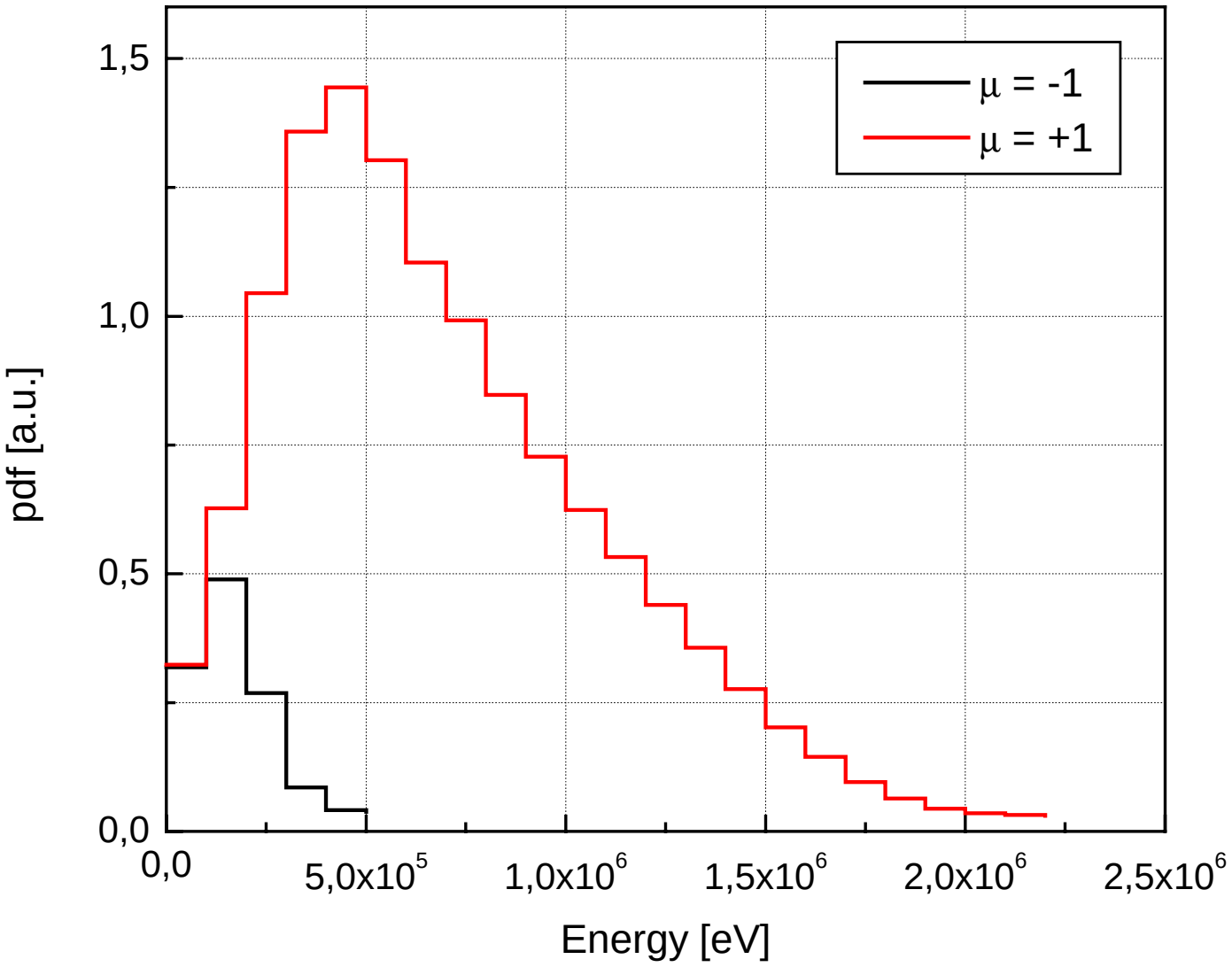
Angular distribution of neutrons from MT876 (E = 14 MeV)



Energy distribution of inelastically scattered neutron from MT876 (E = 14 MeV)



Energy distribution of second neutron from MT876 (E = 14 MeV)



Processing with ACER

- **MT16 (n,2n)**
  - *is now redundant and has to be removed for transport calculations*
  - *could be easily achieved by elimination of all entries in the ENDF-file (includes MF1 directory, MF3 cross sction, and MF6 distributions)*
- **Total size of ACE-file: 33 MB**
  total size of ENDF-file: 17 MB

Checking the ACE-file

- **Completeness**
- **Basic reaction parameters**
- **Cross sections (MF3) including total**
- **Angular distributions; MT876 after adding both neutron contributions**
- **Energy distributions**
- **Alpha-production: yields, contributing MTs, angular and energy distributions**
- **Todo: Application to MCNP-transport benchmarks**

Reactions in ACE-Output

reaction descriptors

reaction	mt	tyr	lsig	land	ldlw	emin	emax	q
elastic	2			1		1.000000E-11	2.000000E+01	
(n,2n)	16	2	1	3075	1	1.748832E+00	2.000000E+01	-1.572800E+00
MT875	875	2	277	4282	95909	2.600000E+00	2.000000E+01	-1.684000E+00
MT876	876	2	466	5891	191785	2.701304E+00	2.000000E+01	-2.429400E+00
MT877	877	2	644	7232	215199	3.091144E+00	2.000000E+01	-2.780000E+00
MT878	878	2	787	8506	313776	3.390300E+00	2.000000E+01	-3.049000E+00
MT879	879	2	917	9780	403686	5.230500E+00	2.000000E+01	-4.704000E+00
MT880	880	2	997	10786	473480	6.215645E+00	2.000000E+01	-5.590000E+00
MT881	881	2	1072	11658	541325	7.094100E+00	2.000000E+01	-6.380000E+00
MT882	882	2	1142	12463	602404	7.516600E+00	2.000000E+01	-6.760000E+00
MT883	883	2	1209	13268	662979	8.828700E+00	2.000000E+01	-7.940000E+00
MT884	884	2	1270	14006	717643	1.254600E+01	2.000000E+01	-1.128300E+01
MT885	885	2	1313	14476	759400	1.313200E+01	2.000000E+01	-1.181000E+01
MT886	886	2	1353	14879	794112	2.800000E+00	2.000000E+01	-2.397000E+00
MT887	887	2	1520	16220	824494	4.447700E+00	2.000000E+01	-4.000000E+00
MT888	888	2	1606	17293	883630	3.724939E+00	2.000000E+01	-3.350000E+00
MT889	889	2	1722	18500	929406	1.851800E+00	2.000000E+01	-1.665400E+00
MT890	890	2	1986	20109	1012511	2.739332E+00	2.000000E+01	-2.463600E+00
(n,p)	103	0	2160			1.427000E+01	2.000000E+01	-1.283000E+01
(n,d)	104	0	2194			1.630100E+01	2.000000E+01	-1.466000E+01
(n,t)	105	0	2222			1.160848E+01	2.000000E+01	-1.044000E+01
(n,a)	107	0	2270			6.671534E-01	2.000000E+01	-6.000000E-01