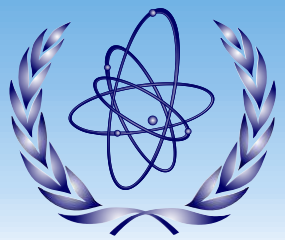


International Atomic Energy Agency

Nuclear Data Activities in the IAEA-NDS

R.A. Forrest

Nuclear Data Section
Department of Nuclear Sciences and Applications

Outline

- NRDC
- NSDD
- EXFOR
- International collaboration
- CRPs
- DDPs
- Training
- Security

NRDC

- International Network of Nuclear Reaction Data Centres (NRDC)
- Aim:
  - EXFOR
- Core data centres:
  - NNDC
  - NEA-DB
  - IAEA-NDS
  - CJD
- 10 specialized centres
- Meeting Vienna, April 2013 (Technical), see http://www-nds.iaea.org/nrdc/nrdc_2013/

NSDD

- International Network of Nuclear Structure and Decay Data Evaluators (NSDD)
- Aim:
  - Provide up-to-date evaluated nuclear structure and decay data
- Regular meetings since 1974
- Last in January 2013 in Kuwait see http://www-nds.iaea.org/nsdd/
- 18 evaluation centres
- ENSDF master database at NNDC

EXFOR

- Compiled experimental data
- The EXFOR database was established in the 1960s
- Originally exclusively neutron-induced reaction data
- Now includes charged particle data and higher energies
- Since 2003 the EXFOR libraries at the various data centres have been merged
- NDS has responsibility for the maintenance of this Master file

EXFOR (cont.)

- EXFOR Compilation Control System used to coordinate the compilation of the data centres
- During 2012, the average time between publication and compilation steady ~ 6 months
- EXFOR contains data for about 20,000 experiments, web content is updated monthly
- Continuing effort to remove errors and inconsistencies from the database

EXFOR (cont.)

- To make best use of these data considerable work on various retrieval and visualisation systems
- Output formats:
  - EXFOR+ format
  - XML and HTML
  - C4 format - numeric data in simple tables
  - Standard EXFOR format
- Development of EXFOR-XML and possible unification with ENDF
  - in frame of SG 38 (2nd Meeting, May 2013)

DDEP

- DDEP collaboration established in 1994
- Decay data specialists who use a specific evaluation methodology
- Publishes decay data through the Bureau International des Poids et Mesures (BIPM) Monographie series
- NDS has been a major contributor to DDEP for many years:
  - CRP on x-ray and gamma ray decay data standards
  - CRP on 'Updated Decay Data Library for Actinides' (84 evaluations)
- Meeting on Metrology, (19 June) organised by EURAMET EMRP will be attended by DDEP members

JEFF project

- NDS staff make technical contributions to the OECD/NEA JEFF Project
- Particularly in the field of decay data
- Approximately 500 decay scheme evaluations adopted into the latest JEFF Radioactive Decay Data sub-library
- IAEA evaluations for reaction data are candidates for inclusion in the next release (JEFF-3.2)

CRPs

- **Coordinated Research Projects (CRPs) are an IAEA tool produce outputs such as data libraries by encouraging collaboration between various parties**
- **3 active**
- **3 planned**

On-going and Planned CRPs

10	Prompt fission neutron spectra for actinides	2009–2013	12 (6)	Capote	On-going
11	Charged-Particle Monitor Reactions and Nuclear Data for Medical Isotope Production	2012–2015	~15 (6)	Capote	On-going
12	Nuclear data for Particle Induced Gamma Ray Emission (PIGE) analysis	2011–2014	11 (6)	Dimitriou	On-going
13	Validation of the International Dosimetry Library IRDFF	2013–2017	-	Simakov Capote	Starting (1st RCM 1-5 July)
14	Beta-delayed Neutron Emission Evaluation	2013–2017	-	Dimitriou	Starting (1st RCM 26-30 August)
15	Primary Radiation Damage Cross Sections	2013-2017	-	Simakov Forrest	Starting (1st RCM 4-8 Nov)

Prompt Fission Neutron Spectra for Actinides (2009 - 2013), R. Capote

- **Objectives:**
  - **Make available existing experimental information on prompt fission neutron spectra (PFNS) relevant to fission reactor applications**
  - **Incorporate available experimental information on PFNS for major actinides into evaluated nuclear data files**
  - **Recommend evaluations of PFNS with covariances from thermal to 20 MeV**
- **3rd RCM, November 2013, IAEA Vienna**

Nuclear data for Particle Induced Gamma Ray Emission (PIGE) analysis (2011-2014) P. Dimitriou

- **Objectives:**
  - **Identify the most important nuclear reactions for PIGE**
  - **Search literature and convert relevant data to correct format**
  - **Compare data from sources and carry out measurements when necessary**
  - **Incorporate all measured data into database**
- **2nd RCM, 8–12 October 2012, IAEA Vienna**

Charged Particle Monitor Reactions and Nuclear Data for Medical Isotope Production (2012-2015) R. Capote

- **Objectives:**
  - Update evaluations of the charged-particle monitor reaction database
  - Evaluate decay data, nuclear reaction cross sections and yields for production of heavy alpha emitters and selected long-lived positron emitters
  - Improve data for accelerator production of diagnostic gamma emitters: ^{123}I, ^{99}Tc and ^{111}In
  - Undertake new measurements and evaluate decay data of: ^{66}Ga, ^{86}Y, ^{103}Pd, ^{73}Se, ^{94m}Tc, ^{72}As, ^{62}Zn, ^{76}Br, ^{89}Zr and ^{120}I if possible
- **1st RCM, December 2012, IAEA Vienna**

Validation of the International Dosimetry Library (IRDFF) (2013-2017) Simakov-Capote

- A new dosimetry library for fission and fusion applications (IRDFF) has been developed and released in February 2012
- 1st RCM to be held 1-5 July 2013 objective is to validate IRDFF
- More information at: *http://www-nds.iaea.org/IRDFFtest/*

Primary Radiation Damage Cross Sections (2013-2017) Simakov-Forrest

- **Bring together Nuclear Data and Radiation Materials Experts**
  - **to revisit NRT-dpa standard and to implement an upgraded one that will account for primary radiation defects (Frankel pairs, clusters …) that survive after cascade relaxation**
  - **improving gas production cross sections**
- **1st RCM to be held 4-8 Nov 2013 to coordinate specific tasks (Fe – starting element)**
- **More information at: *http://www-nds.iaea.org/CRPdpa/dpa.htm***

Beta-delayed neutron emission evaluation (2013-2017) P. Dimitriou

- **Beta-delayed neutrons are important for energy production, astrophysics and nuclear theory**
- **1st RCM will be held 26-30 August 2013 in Vienna**
- **More information at: *http://www-nds.iaea.org/beta-delayed-neutron/***

DDPs

- **Data Development Projects (DDPs) are carried out by the IAEA through:**
  - **Consultancy visits**
  - **Service agreements**
  - **Work undertaken directly by NDS staff**
- **Example:**
  - **Neutron cross section standards (will contribute to CIELO) CM will be held 8-12 July to discuss next steps**

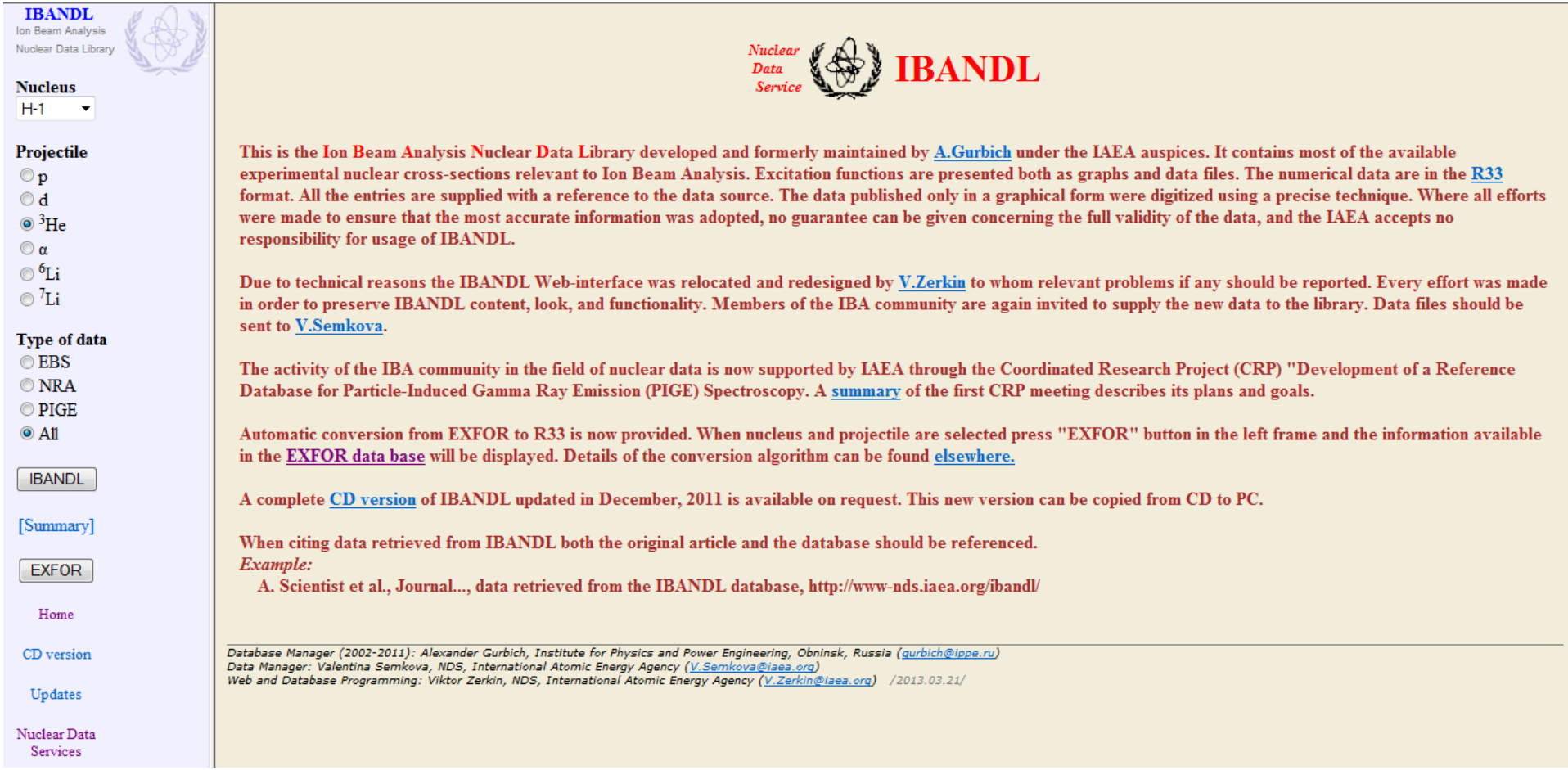
Training

- Provide outreach in the form of training, especially to developing countries
- EXFOR workshop (27-30 August)
- EMPIRE workshop (18-22 Nov)
- Workshops held at ICTP Trieste (~ 2 per year)
  - 2012: Atomic & Molecular
  - 2012: NSDD related
  - 2013: Advanced Reactor Systems (30 Sept-4 Oct)
  - 2013: Analytical Applications (21-25 Oct)

IT security

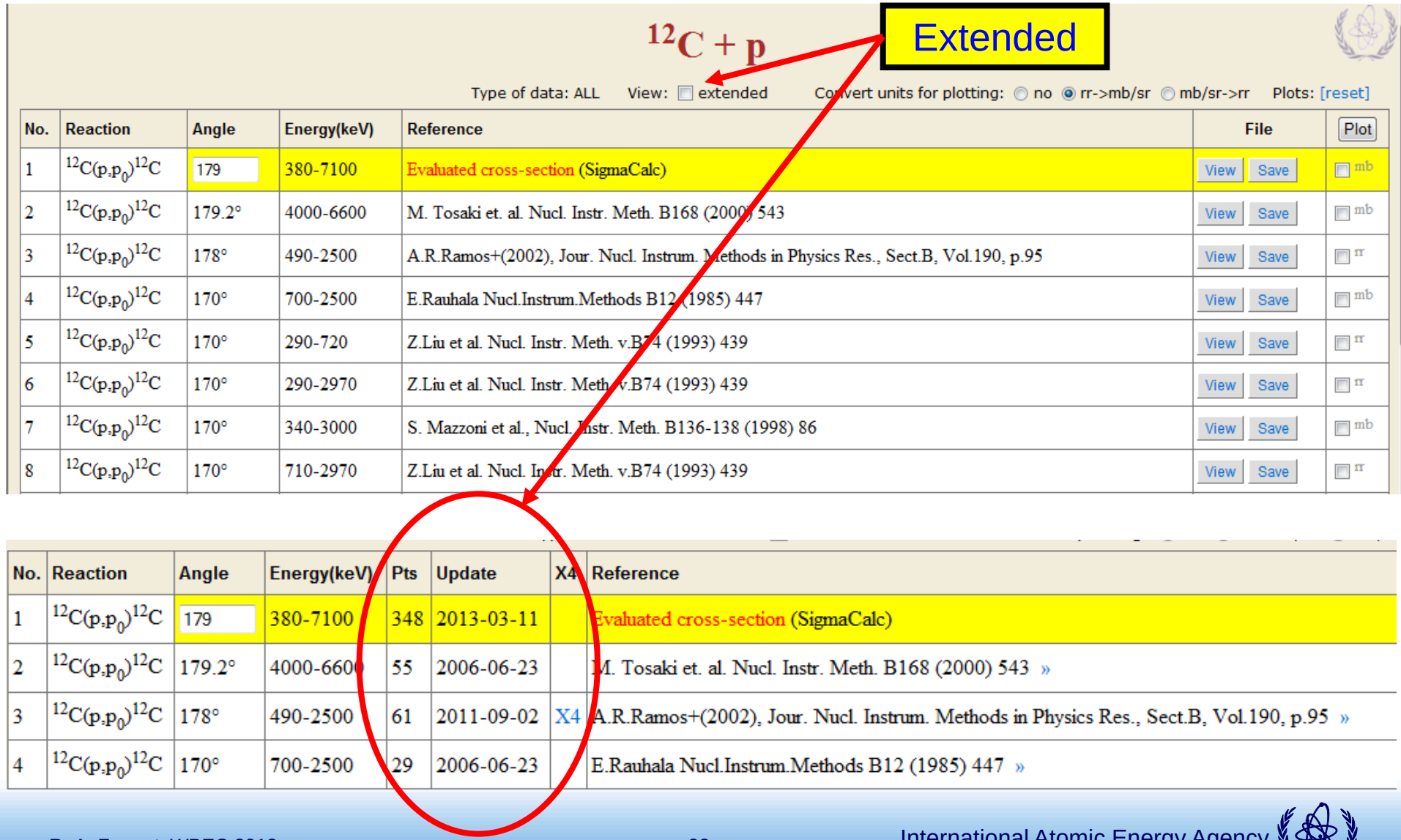
- First web site shutdown – 3rd February 2012 (1 week)
- Second shutdown - 27th April 2012 (2 weeks)
- Third shutdown – 30th November 2012 - 28th January 2013
- The servers are now located ‘in the cloud’
- Even after 4 months we are missing functionality (scripts)
- RIPL and IBANDL sites now functional

IBANDL



New Front page

IBANDL



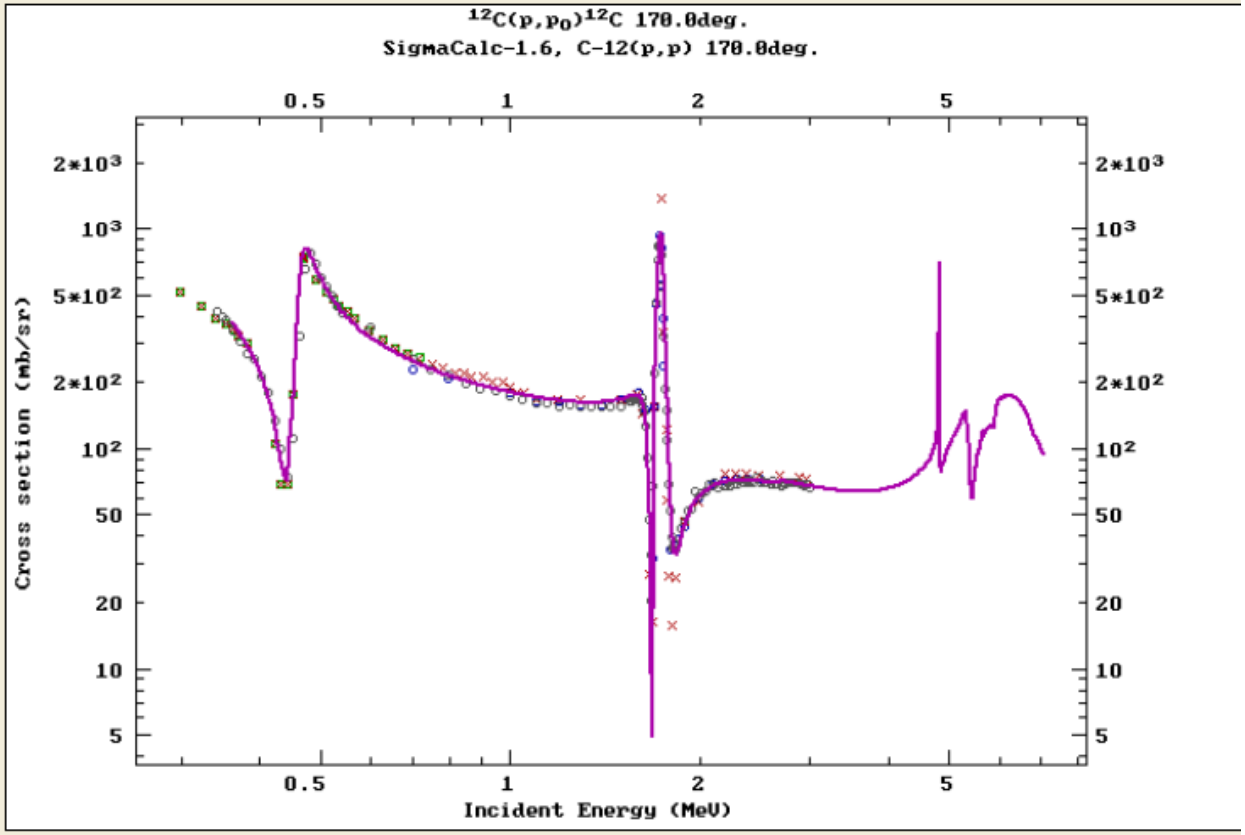
No.	Reaction	Angle	Energy(keV)	Pts	Update	X4	Reference
1	$^{12}C(p,p_0)^{12}C$	179	380-7100	348	2013-03-11		Evaluated cross-section (SigmaCalc)
2	$^{12}C(p,p_0)^{12}C$	179.2°	4000-6600	55	2006-06-23		M. Tosaki et. al. Nucl. Instr. Meth. B168 (2000) 543 »
3	$^{12}C(p,p_0)^{12}C$	178°	490-2500	61	2011-09-02	X4	A.R.Ramos+(2002), Jour. Nucl. Instrum. Methods in Physics Res., Sect.B, Vol.190, p.95 »
4	$^{12}C(p,p_0)^{12}C$	170°	700-2500	29	2006-06-23		E.Rauhala Nucl.Instrum.Methods B12 (1985) 447 »

IBANDL

Welcome to Web-ZVView!

Interactive plotting of IBANDL and SigmaCalc data

1) θ=170° E.Rauhala Nucl.Instrum.Methods B12 (1985) 447
2) θ=170° Z.Liu et al. Nucl. Instr. Meth. v.B74 (1993) 439
3) θ=170° Z.Liu et al. Nucl. Instr. Meth. v.B74 (1993) 439
4) θ=170° S. Mazzoni et al., Nucl. Instr. Meth. B136-138 (1998) 86
5) θ=170.0° generated by SigmaCalc version 1.6. C-12(pp) at 170.0 deg.



Log: XY X Y Lin: XY X Y Auto-range: XY X Y Page: >> << Zoom: <> >< Grid: VH 0 V H Pts: Txt Box PL

Use of ZVView

New Features

No Security issues

Thank you!