

Proposal to the NIAC to ratify elements key to the Muon Instrument Definition (ver. 2)

1. **The name ‘idf_version’ (for inclusion in NXentry) should be reserved to hold the version number (as an NX_INT) of the Instrument Definition File (IDF) used to write the data file.**

Historically, this has been used by the muon community for identifying the version of the IDF to which the data file conforms, and its exclusion or alternative use would be problematic for existing analysis code. It should be noted, that the recent muon data files are written containing both ‘idf_version’ and ‘IDF_version’, and therefore interrogating either case will yield a definite result.

2. **The definition of ‘NXlog’ should be extended to permit an array of arrays (one dimensional) to be logged.**

This will permit vector quantities to be logged, and enable a wide range of diagnostic data (e.g. oscilloscope traces) to be recorded.

3. **The class ‘NXrunlog’ should be defined as a container for time logged parameters arising from activities of the data acquisition electronics (DAE) during a run.**

The tabular definition is shown below. No entries are proposed for ratification as the contents are expected to be facility specific.

RE	Name	Attribute	Type	Value	Description
	NXrunlog				
Class to contain action and acquisition logs arising from activities of the data acquisition electronics (DAE) during the run – entries will be facility specific.					

4. **The class ‘NXselog’ should be defined as a container for time logged parameters arising from activities of the data acquisition electronics (DAE) during a run.**

The tabular definition is shown below. No entries are proposed for ratification as the contents are expected to be facility specific.

RE	Name	Attribute	Type	Value	Description
	NXselog				
Class to contain acquisition logs arising from activities of the data acquisition electronics (DAE) during the run – entries will be facility specific.					

5. **The class ‘NXperiod’ should be defined as a container for parameters relating to operation of period data acquisition.**

The tabular definition is shown below; however, it is expected that facilities will extend the scope of the class according to local requirements.

RE	Name	Attribute	Type	Value	Description
	NXperiod				
1	number		NX_INT	‘np’	number of periods used
1	type		NX_INT[np]	‘1’ ‘2’	function of period: ‘1’ – DAQ, ‘2’ – DWELL
1	frames_request ed		NX_INT[np]		frames collected in each period before

					switching, '0' for unlimited frames
1		frame_type	NX_CHAR	'good' 'raw'	type of frame for period switching
0/1	output		NX_INT[np]		output bit pattern on period card. If not known, write '0' ... 'np'-1 into array
0/1	labels		NX_CHAR		list of period names, separated by character given as attribute. May use a 2D array of NX_CHAR - TBC
0/1		separator	NX_CHAR		separator character for label list
0/1	raw_frames		NX_INT[np]		raw frames collected for each period
0/1	good_frames		NX_INT[np]		good frames collected for each period
0/1	sequences		NX_INT[np]		number of times data collection took place in each period
0/1	counts		NXlog		counts collected in each periods

5. The class '*NXdae*' should be defined as a container for parameters relating to operation of the data acquisition electronics (DAE).

The tabular definition is shown below; however, it is expected that facilities will extend the scope of the class according to local requirements.

RE	Name	Attribute	Type	Value	Description
	NXdae				
1	type		NX_CHAR	'ISIS_MCS' 'ISIS_DAE2' 'RIKEN-RAL_MACS-EXP'	description of DAE hardware: form name as 'facility'_ 'dae'
0/1	interface		NX_CHAR	'CAMAC' 'VME'	
Class to contain entries describing the data acquisition electronics (DAE). 'type' is required, other entries will be facility specific.					

6. The class '*NXuif*' should be defined as a container for additional data/information defined by the user.

The contents are not defined and will be facility/experiment specific.

7. The class '*NXbeamline*' should be defined to provide information on the beamline.

Essentially this will define the equipment and settings to transport the beam between target and instrument, and therefore it is included as an entry of *NXinstrument*.

RE	Name	Attribute	Type	Value	Description
	NXbeamline				
1	beamline		NX_CHAR		name
0/1	diagnostics		NXdiagnostics		container for any beamline diagnostic information.
0/1+	{ <i>beamline component</i> }		NXdipole_magnet NXquadrupole_magnet NXsolenoid_magnet NXelectrostatic_kicker NXmagnetic_kicker NXseparator NXbeamline_aperture NXseptum_magnet NXsteering_magnet		beamline components

The following classes are defined to store relevant data within *NXbeamline*. It is anticipated that facilities will extend the scope of these classes to provide, for example, metadata sufficient for beam transport calculations. A further proposal may be made to the NIAC to formalise additional entries.

8. The class '*NXdiagnostics*' should be defined as a container for diagnostic information on beamline function.

RE	Name	Attribute	Type	Value	Description
	NXdiagnostics				diagnostics
1+	type		NX_CHAR		type of diagnostic
Class to contain entries describing diagnostic information relating to the beamline. Pictures, etc, may be included within NXnote's, while logged entries should use NXlog.					

9. The class '*NXdipole_magnet*' should be defined for a dipole magnet.

While the class *NXbending_magnet* is already defined by the NIAC (see <http://www.nexusformat.org/NIAC2006: Synchrotron Group>), the aim of this proposal is to provide appropriate class definitions to map directly to elements typically required for a charged particle beamline. We therefore propose that either this new definition coexists with *NXbending_magnet* or that it replaces the earlier definition.

RE	Name	Attribute	Type	Value	Description
	NXdipole_magnet				component name
1	description		NX_CHAR		name
0/1	source_distance		NX_FLOAT		flight path from

					production target
0/1		units	NX_CHAR	'metres'	
0/1	set_current		NX_FLOAT		set value on PS
0/1		units	NX_CHAR		
0/1	read_current		NXlog		
0/1		units	NX_CHAR		
0/1	read_voltage		NXlog		
0/1		units	NX_CHAR		

10. The class '*NXquadrupole_magnet*' should be defined for a quadrupole magnet.

RE	Name	Attribute	Type	Value	Description
	NXquadrupole_magnet				component name
1	description		NX_CHAR		name
0/1	source_distance		NX_FLOAT		flight path from production target
0/1		units	NX_CHAR	'metres'	
0/1	set_current		NX_FLOAT		set value on PS
0/1		units	NX_CHAR		
0/1	read_current		NXlog		read from PS
0/1		units	NX_CHAR		
0/1	read_voltage		NXlog		read from PS
0/1		units	NX_CHAR		

11. The class '*NXseptum_magnet*' should be defined for a septum magnet.

RE	Name	Attribute	Type	Value	Description
	NXseptum_magnet				component name
1	description		NX_CHAR		name
0/1	source_distance		NX_FLOAT		flight path from production target
0/1		units	NX_CHAR	'metres'	
0/1	set_current		NX_FLOAT		set value on PS
0/1		units	NX_CHAR		
0/1	read_current		NXlog		value read from PS (may be logged)
0/1		units	NX_CHAR		
0/1	read_voltage		NXlog		read from PS
0/1		units	NX_CHAR		

12. The class '*NXsolenoid_magnet*' should be defined for a solenoid magnet.

RE	Name	Attribute	Type	Value	Description
	NXsolenoid_magnet				component name
1	description		NX_CHAR		name

0/1	source_distance		NX_FLOAT		distance of flight path from production target
0/1		units	NX_CHAR	'metres'	
0/1	set_current		NX_FLOAT		set value on PS
0/1		units	NX_CHAR		
0/1	read_current		NXlog		read from PS
0/1		units	NX_CHAR		
0/1	read_voltage		NXlog		read from PS
0/1		units	NX_CHAR		

13. The class '*NXsteering_magnet*' should be defined for a steering magnet

RE	Name	Attribute	Type	Value	Description
	NXsteering_magnet				component name
1	description		NX_CHAR		name
0/1	source_distance		NX_FLOAT		distance of flight path from production target
0/1		units	NX_CHAR	'metres'	
0/1	set_current		NX_FLOAT		set value on PS
0/1		units	NX_CHAR		
0/1	read_current		NXlog		read from PS
0/1		units	NX_CHAR		
0/1	read_voltage		NXlog		read from PS
0/1		units	NX_CHAR		

14. The class '*NXseparator*' should be defined for an electrostatic separator.

RE	Name	Attribute	Type	Value	Description
	NXseparator				component name
1	description		NX_CHAR		name
0/1	source_distance		NX_FLOAT		distance of flight path from production target
0/1		units	NX_CHAR	'metres'	
0/1	set_Bfeild_current		NX_FLOAT		set value on PS
0/1		units	NX_CHAR		
0/1	read_Bfield_current		NXlog		read from PS
0/1		units	NX_CHAR		
0/1	read_Bfield_voltage		NXlog		read from PS
0/1		units	NX_CHAR		
0/1	set_Efield_voltage		NX_FLOAT		set value on PS
0/1		units	NX_CHAR		
0/1	read_Efield_current		NXlog		read from PS
0/1		units	NX_CHAR		

0/1	read_Efield_voltage		NXlog		read from PS
0/1		units	NX_CHAR		

15. The class '*NXspin_rotator*' should be defined for a particle spin rotator.

RE	Name	Attribute	Type	Value	Description
	NXspin_rotator				component name
1	description		NX_CHAR		name
0/1	source_distance		NX_FLOAT		distance of flight path from production target
0/1		units	NX_CHAR	'metres'	
0/1	set_Bfield_current		NX_FLOAT		set value on PS
0/1		units	NX_CHAR		
0/1	read_Bfield_current		NXlog		read from PS
0/1		units	NX_CHAR		
0/1	read_Bfield_voltage		NXlog		read from PS
0/1		units	NX_CHAR		
0/1	set_Efield_voltage		NX_FLOAT		set value on PS
0/1		units	NX_CHAR		
0/1	read_Efield_current		NXlog		read from PS
0/1		units	NX_CHAR		
0/1	read_Efield_voltage		NXlog		read from PS
0/1		units	NX_CHAR		

16. The class '*NXmagnetic_kicker*' should be defined for a magnetic beam kicker.

RE	Name	Attribute	Type	Value	Description
	NXmagnetic_kicker				component name
1	description		NX_CHAR		name
0/1	source_distance		NX_FLOAT		distance of flight path from production target
0/1		units	NX_CHAR	'metres'	
0/1	timing		NX_FLOAT		kicker timing, as defined by 'description' attribute
0/1		units	NX_CHAR	'nano.second'	
0/1		description	NX_CHAR		
0/1	set_voltage		NX_FLOAT		set value on PS
0/1		units	NX_CHAR		
0/1	read_voltage		NXlog		read from PS
0/1		units	NX_CHAR		

0/1	set_current		NX_FLOAT		set value on PS
0/1		units	NX_CHAR		
0/1	read_currente		NXlog		read from PS
0/1		units	NX_CHAR		

17. The class *NXelectrostatic_kicker* should be defined for an electrostatic beam kicker.

RE	Name	Attribute	Type	Value	Description
	NXelectrostatic_kicker				component name
1	description		NX_CHAR		name
0/1	source_distance		NX_FLOAT		distance of flight path from production target
0/1		units	NX_CHAR	'metres'	
0/1	timing		NX_FLOAT		kicker timing, as defined by 'description' attribute
0/1		units	NX_CHAR	'nano.second'	
0/1		description	NX_CHAR		
0/1	set_voltage		NX_FLOAT		set value on PS
0/1		units	NX_CHAR		
0/1	read_voltage		NXlog		read from PS
0/1		units	NX_CHAR		
0/1	set_current		NX_FLOAT		set value on PS
0/1		units	NX_CHAR		
0/1	read_currente		NXlog		read from PS
0/1		units	NX_CHAR		

18. The class *NXbeamline_collimator* should be defined for a beamline collimator.

An alternative class definition is preferred to that of *NXaperture* or *NXcollimator* (defined as part of *NXinstrument*) as this component is clearly part of the beamline instead of the instrument.

RE	Name	Attribute	Type	Value	Description
	NXbeamline_collimator				
1	description		NX_CHAR		name
0/1	source_distance		NX_FLOAT		distance of flight path from production target
0/1		units	NX_CHAR	'metres'	
0/1	shape		NXgeometry		shape of aperture
0/1	material		NX_CHAR		material from which aperture is fabricated