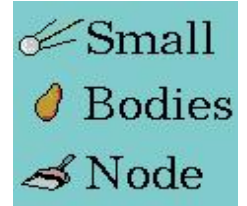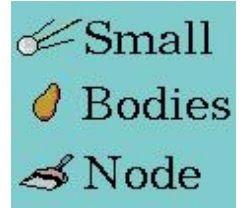# Display LDD

Anne Raugh & Mike A'Hearn

Basic Issues

- This does not incorporate some features that have been discussed in the past and, we thought, agreed to.
  - This is mostly in the text describing how to use the class. E. Rye says this is not hard to fix

- The geometric issues, which are excluded here, are presumably being dealt with by the geometry working group but we have not heard anything on this topic.
  - Or did geometry punt the issue back to display?

- In the absence of a connection to the definitions of geometry, this is not useful
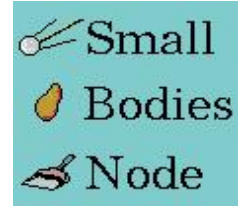
Basic Display Class

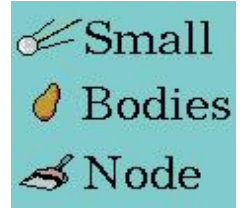| Class	Attribute	Required?	Values	Definition
Default_Display_Settings				The Default_Display_Settings class provides parameters with default values for the display of a generic Array object on a given display device.
	local_identifier_reference	required		The local_identifier_reference attribute provides the local_identifier of the digital object described by the referencing class (in this case, the Default_Display_Settings class). Note that a local_identifier attribute, with the same value as this local_identifier_reference, must be present within the label.
	comment	optional		The comment attribute is a character string expressing one or more remarks or thoughts relevant to the object.
	horizontal_display_axis	required		The horizontal_display_axis attribute identifies, by name, the axis of an Array (or Array subclass) that is intended to be displayed in the horizontal or "sample" dimension on a display device. The value of this attribute must match the value of one, and only one, axis_name attribute in an Axis_Array class of the associated Array.
	horizontal_display_direction	required	"Left" or "Right"	The horizontal_display_direction attribute specifies the direction across the screen of a display device that data along the horizontal axis of an Array is supposed to be displayed.
	vertical_display_axis	required		The vertical_display_axis attribute identifies, by name, the axis of an Array (or Array subclass) that is intended to be displayed in the vertical or "line" dimension on a display device. The value of this attribute must match the value of one, and only one, axis_name attribute in an Axis_Array class of the associated Array.
	vertical_display_direction	required	"Down" or "Up"	The vertical_display_direction attribute specifies the direction along the screen of a display device that data along the vertical axis of an Array is supposed to be displayed.

Basic Display Class Comments

- Local_Identifier_Reference
  - Is not enforced by schema but is reputedly under discussion
- There MUST be a requirement that the choice of axes NOT lead to a mirror image of the actual scene
  - schema can not enforce this – must check manually
  - Focal plane engineers and detector scientists often want the opposite, but most scientists do not
- Despite disavowal of any geometry here, there must be a requirement that any directions of geometric parameters elsewhere in the label will be correct only if this display convention is followed
  - This is, in SBN's view, the entire point of having this class
- Wouldn't axis ID be better as axis sequence number rather than name?
  - Easier/more efficient to program

Default_Display_Settings_Color   The Default_Display_Settings_Color class provides parameters with default values for the display of a multi-banded Array object in the red, green, and blue channels of a display device.

Contains everything in Default_Display_Setting plus:

|		
color_display_axis	required	The color_display_axis attribute identifies, by name, the axis of an Array (or Array subclass) that is intended to be displayed in the color dimension of a display device. I.e., bands from this dimension will be loaded into the red, green, and blue bands of the display device. The value of this attribute must match the value of one, and only one, axis_name attribute in an Axis_Array class of the associated Array.
red_channel_band	required	The red_channel_band attribute identifies the number of the band, along the band axis, that should be loaded, by default, into the red channel of a display device. The first band along the band axis has band number 1.
green_channel_band	required	The green_channel_band attribute identifies the number of the band, along the band axis, that should be loaded, by default, into the green channel of a display device. The first band along the band axis has band number 1.
blue_channel_band	required	The blue_channel_band attribute identifies the number of the band, along the band axis, that should be loaded, by default, into the blue channel of a display device. The first band along the band axis has band number 1.

Color Class Comments
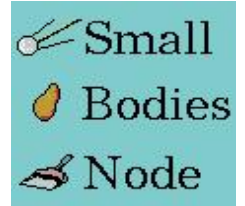
- Same comment as above about axis sequence number vs. axis name
- Seems to be a rather specialized case of multicolor imaging
  - Not driven by science
- No other comments
  - SBN does not currently use this
  - SBN has no data in RGB colors – only in filters for target analysis, but might find a way to use it for "false color" images

Color Movie Class
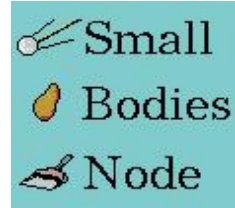
***Default_Display_Settings_Color_Movie***   The Default_Display_Settings_Color_Movie class provides parameters settings default values for the display of an Array object containing both color bands and frames designed to be displayed consecutively on a display device capable of display video content.

Contains everything in Default_Display_Settings_Color plus:

|			
time_display_axis	required		The time_display_axis attribute identifies, by name, the axis of an Array (or Array subclass), the bands of which are intended to be displayed sequentially in time on a display device. The frame_rate attribute, if present, provides the rate at which these bands are to be displayed.
frame_rate	optional		The frame_rate attribute indicates the number of still pictures (or frames) that should be displayed per unit of time in a video. Note this is NOT necessarily the same as the rate at which the images were acquired.
loop_flag	optional	"false" or "true"	The loop_flag attribute specifies whether or not a movie object should be played repeatedly without prompting from the user.
loop_count	optional		The loop_count attribute specifies the number of times a movie should be "looped" or replayed before stopping.
loop_delay	optional		The loop_delay attribute specifies the amount of time to pause between "loops" or repeated playbacks of a movie.
loop_back_and_forth_flag	optional	"false" or "true"	The loop_back_and_forth_flag attribute specifies whether or not a movie should only be "looped" or played repeatedly in the forward direction, or whether it should be played forward followed by played in reverse, iteratively.

Color Movie Class Comments
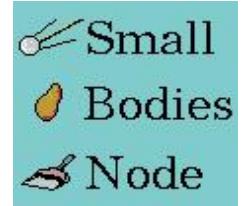
- Same comment about axis sequence number *vs.* axis name

- Only the identification of the time axis seems to be scientifically necessary
  - As a user of movies for science, I usually vary ALL the parameters to understand the behavior of the object being studied
  - Is there a scientific use for these parameters?
  - Most movie viewers ask whether the user wants to loop or not and most allow frame-by-frame stepping
    - Is this just setting default parameters for a "pretty" movie?
  - Since these are all optional, this is not a serious objection, more an inquiry into the philosophy of what is included
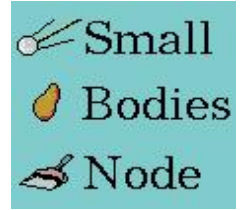
***Default_Display_Settings_Movie*** The Default_Display_Settings_Movie class provides parameters setting default values for the display of an Array_3D_Movie object using a software application capable of displaying video content.

Contains everything in Default_Display_Settings plus:

|			
time_display_axis	required		As for ~Color_Movie
frame_rate	optional		As for ~Color_Movie
loop_flag	optional	"false" or "true"	As for ~Color_Movie
loop_count	optional		As for ~Color_Movie
loop_delay	optional		As for ~Color_Movie
loop_back_and_forth_flag	optional	"false" or "true"	As for ~Color_Movie

Movie Class Comments
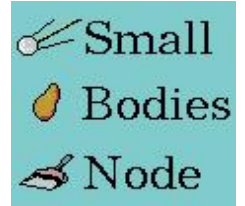
- Same comments as for Color Movie

- No serious objections to the additional parameters for Color Movie and Movie since all are optional except specification of the time axis, which obviously is needed. We just question if they are needed or will be used?

- Does it need a requirement to specify the direction in which the time axis increases?
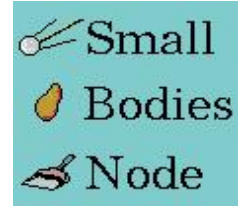 - Or is this implicit in defining the axis?

Geometry Class
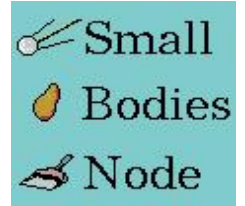
- Draft document from Ed Guiness to geometry working group.
  - Aimed at solid body imaging so does not include everything relevant to SBN
  - Does include (Table 1 – the recommended starting point) "North Azimuth"

- North Azimuth must be defined relative to the axes of the image
  - Requires that one knows the display directions
  - Requires that there be a link between the geometry class and the display class
  - Implies requirements on Axis_Display_Direction to be consistent with the geometric definitions

Summary

- ## SBN needs geometry to migrate or ingest anything other than tables
  - All our images and long-slit spectra use geometrical information
  - Current definition does not meet our need

- ## Coordination with the geometry class is needed
  - We need to be able to tie geometric parameters of images (*e.g.*, which direction is north?) to an actual display of the image
  - North azimuth, as discussed in geometry white paper, must refer to specific display directions