

1. Scene setup

Scene for iLumographic printing can be created in any 3D modeling program that allows to setup virtual camera with custom field of view (FOV) and custom camera motion parameters. Scene positioning and rendering camera settings are very important and shall be setup only in accordance to this instruction.

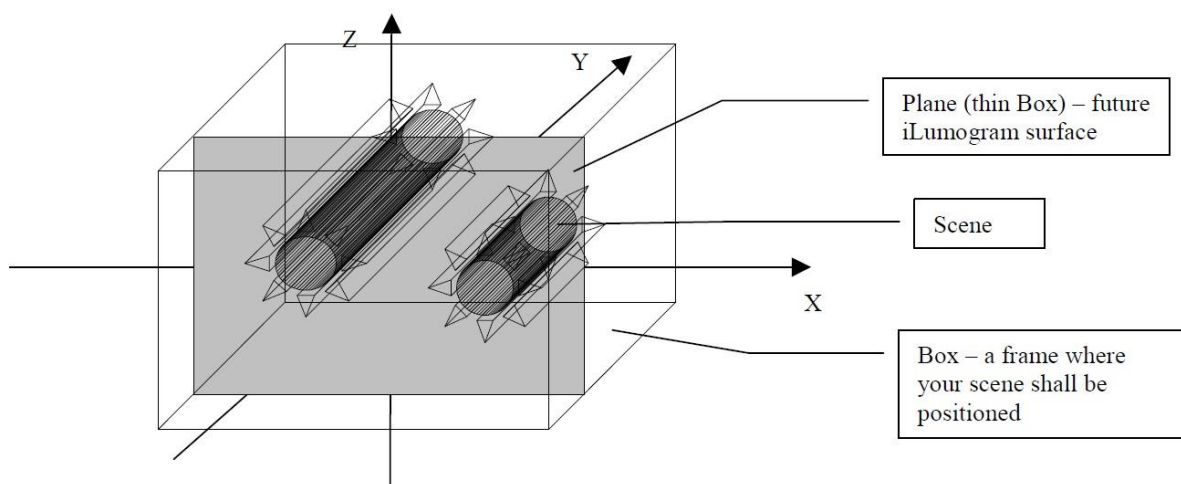
The center of the scene shall be placed in the centre of the coordinates ($x=0,y=0,z=0$). It's convenient to adjust the size of the scene in centimeters, according to the size of the forthcoming iLumogram. In order to preview the upcoming iLumogram, it's convenient to create standard primitive "Plane" or "Box" (semitransparent, non-renderable), correspondent to the size of future iLumogram and placed at same coordinates ($x=0,y=0,z=0$). For example, for a iLumogram in size 1000x1500 millimeters, the "Plane" is created with the same dimensions 1000x1500. (If you will prefer to use a "Box" – it shall be 1500x1000x5). This Plane (thin Box) will represent the surface of your iLumogram – all what will be viewable at this Plane – will be as well viewable on iLumogram.

Your scene shall be created in the range of this "Plane". The size of the scene must not be bigger than 1000x1500 (the size of the iLumogram) x1500 (iLumogram's depth) mm. The scene of this size must not come out of the iLumogram surface (Plane) for more than 400mm. Practically, this number (400mm) could be higher, but this may cause the coming out details of the iLumogram look inaccurate (blurred).

If the desired iLumogram shall be smaller than 1000 x 1500 mm, the scene's fragments coming out of the Plane shall be as well smaller. For example, if the iLumogram size will be 500x750mm, the scene shall not come out of the Plane for more than 200 mm (of course, for the artistic effect you can make scene coming out for more, but you shall keep in mind that in such a case scene's edge will be blurred)

The deepness of scene also has its limit - the clear image depth of a iLumogram in size of 1000x1500mm will be 1100mm – the scene's details that will be placed deeper, would be also viewed, but will look blurred.

It's also convenient to create semitransparent, non-renderable primitive "Box" with size 100x150x150cm and place it in such a way that 40cm of it would be in front of the Plane and 110cm – behind it (see picture below).



All parts of your scene that fit into this box will be visible when iLumogram viewer is in front of the iLumogram. Parts of the scene that are outside of this box either will be blurred, or visible only from certain angle of view.

When creating the scenes for the smaller size iLumograms, accordingly smaller primitives “Plane” and “Box” shall be created. The contrast depth and the part of the image coming out of the iLumogram will be also accordingly smaller.

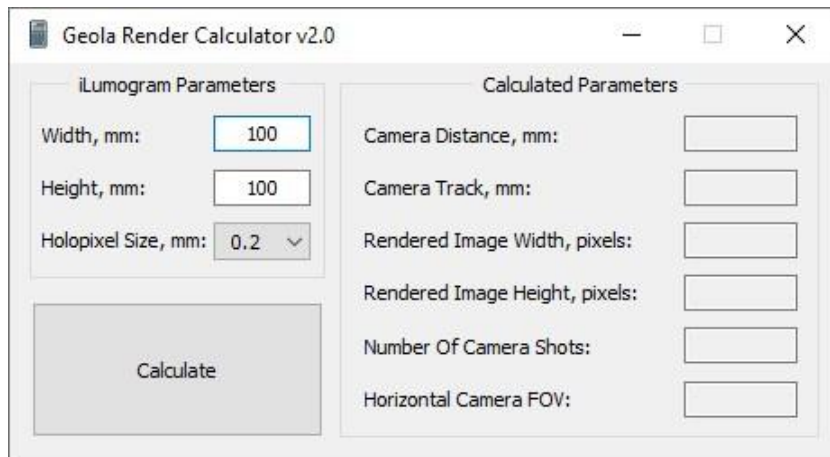
2. Camera setup

To render scene properly and obtain files suitable for iLumographic printing, you will need to setup a virtual camera exactly as per instructions below. In iLumography, camera shall move in front of the scene from left to right and in parallel to the Plane representing iLumogram surface. Geola Digital program called “Geola Render Calculator” will tell you exact length of the camera’s moving track, camera’s distance from the scene and other necessary rendering parameters.

Virtual camera setup in Blender will be in details described below. As an example we will take camera setup for the iLumogram in size 100x100mm with 0.2mm holopixel size.

First you need to add “Camera”. The parameters of the camera for the particular iLumogram size shall be taken from Geola Render Calculator.

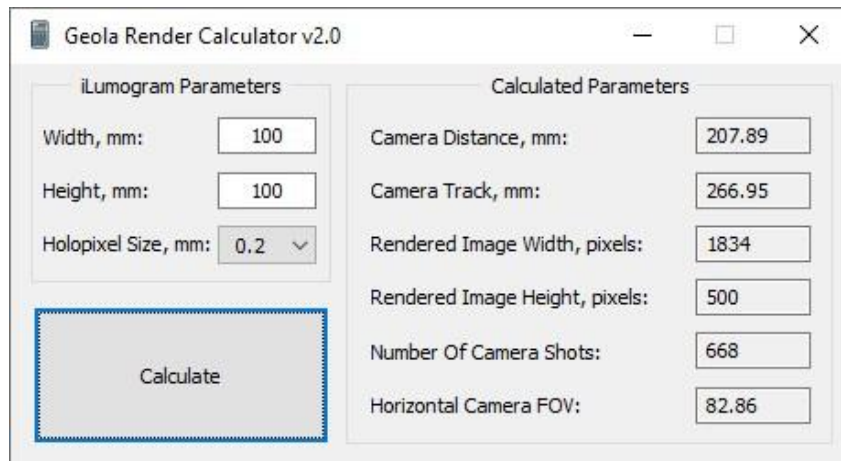
When Geola Render Calculator is launched, the window appears:



iLumogram Parameters	Calculated Parameters
Width, mm: 100	Camera Distance, mm:
Height, mm: 100	Camera Track, mm:
Holopixel Size, mm: 0.2	Rendered Image Width, pixels:
Calculate	Rendered Image Height, pixels:
	Number Of Camera Shots:
	Horizontal Camera FOV:

You shall enter the desired iLumogram parameters in the corresponding fields. Enter iLumogram Width, Height and select Holopixel Size, then press button “Calculate”.

Press button “Calculate” – program will give you camera and rendered images parameters for your iLumogram:

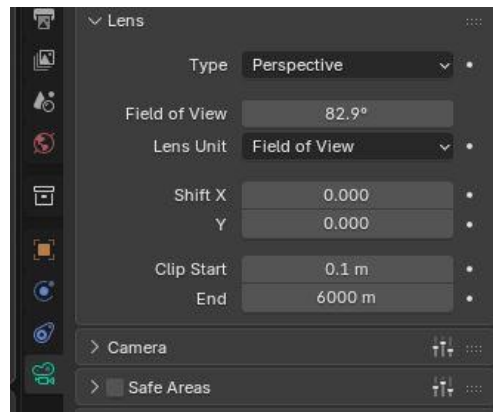


iLumogram Parameters	Calculated Parameters
Width, mm: 100	Camera Distance, mm: 207.89
Height, mm: 100	Camera Track, mm: 266.95
Holopixel Size, mm: 0.2	Rendered Image Width, pixels: 1834
Calculate	Rendered Image Height, pixels: 500
	Number Of Camera Shots: 668
	Horizontal Camera FOV: 82.86

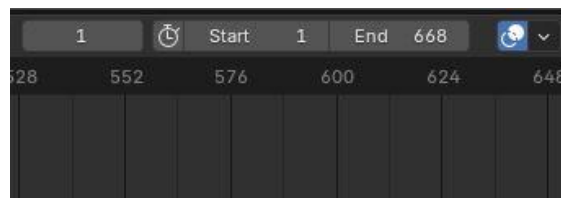
As we can see from the picture, for the iLumogram in size of 100x100mm, the camera has to be placed at the distance of 207.89 millimeters from the center of the scene and horizontal camera's "FOV" must have 82.86 degrees. Then camera shall move in front of the scene for 266.95 mm and 668 frames shall be taken during that movement.

That means that during rendering your camera shall move from coordinates $x=-133.475$, $y=0$, $z=207.89$ to coordinates $x=133.475$, $y=0$, $z=207.89$.

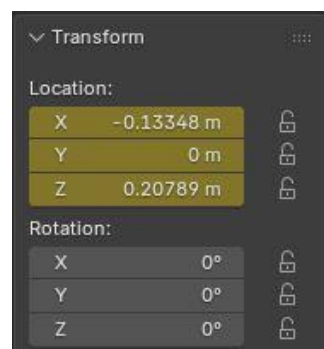
Let's setup camera. Place Perspective Camera at coordinates $x=0$, $y=0$, $z=0$ and enter camera FOV=82.86 degrees in Camera's "Object Data Properties"



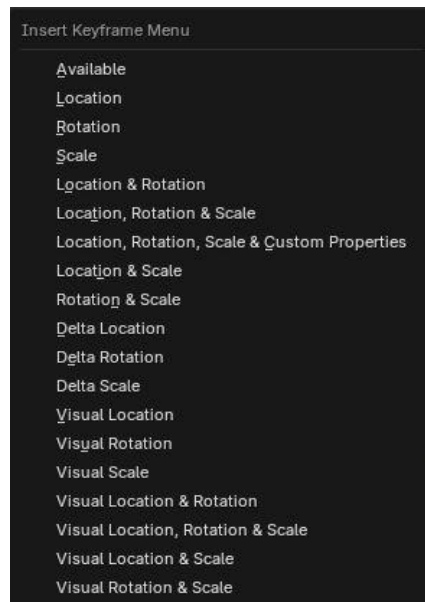
Now you need to tell program how many frames shall be taken with this camera. As you see, for 100x100mm iLumogram printing you will need to have 668 frames rendered. This could be done under the "Timeline" control.



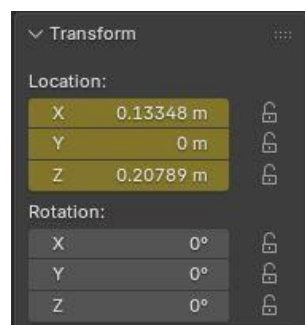
Select first frame in Timeline control, select Camera and enter the following coordinates, taken from the Geola Render Calculator:



Then within main view press "K" on keyboard to call the "Insert Keyframe Menu" and select "Location" to store camera location for the first frame.

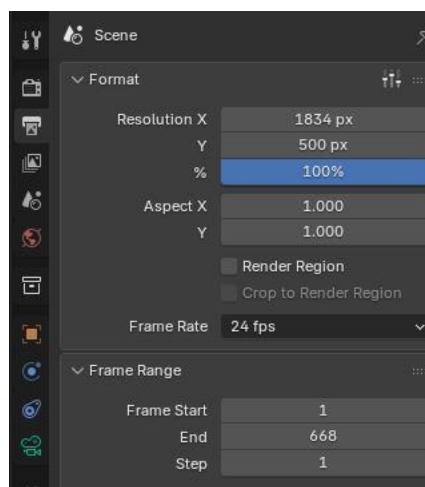


Select last frame in Timeline control, select Camera (if not selected) and enter the following coordinates, taken from the Geola Render Calculator:



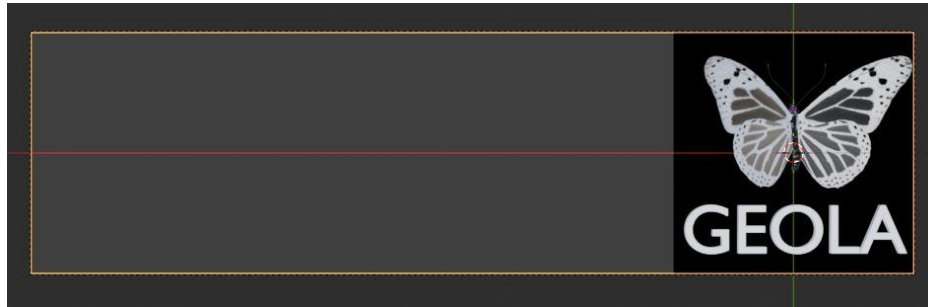
Within main view press “K” on keyboard to call the “Insert Keyframe Menu” and select “Location” to store camera location for the last frame.

Under “Output Properties” control enter Render Image Width and Height, taken from the Geola Render Calculator:

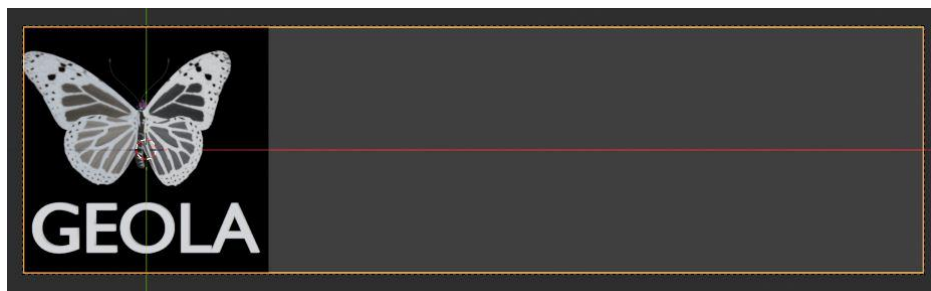




Now you can toggle the camera view and check if camera moves when you are dragging “Timeline” control slider from left to right. When moving the slider, the whole scene can be viewed from the different angles:

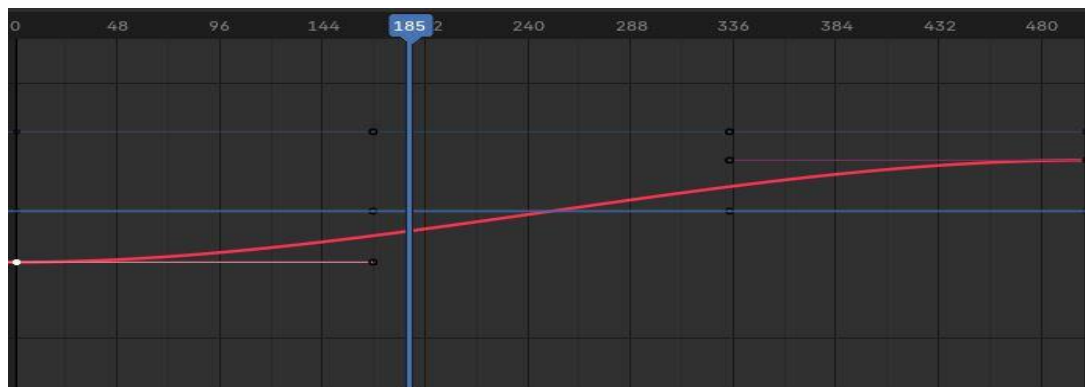


Camera view at X position = -133.475mm



Camera view at X position = 133.475mm

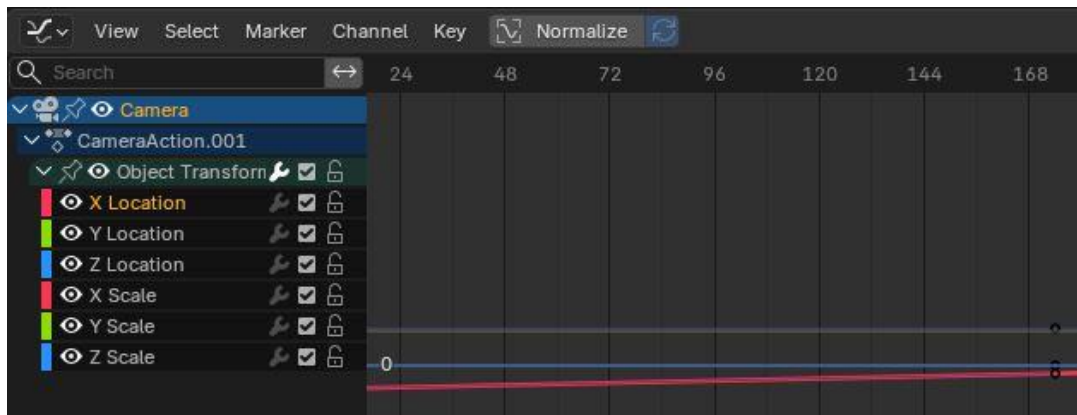
For iLumographic rendering camera shall move with continuous velocity. By default Blender sets camera to move with variable velocity. Some other programs also can have such default settings. If rendering is made with camera moving with not constant velocity, then such files cannot be used for iLumographic printing. By default camera movement curve looks like this:



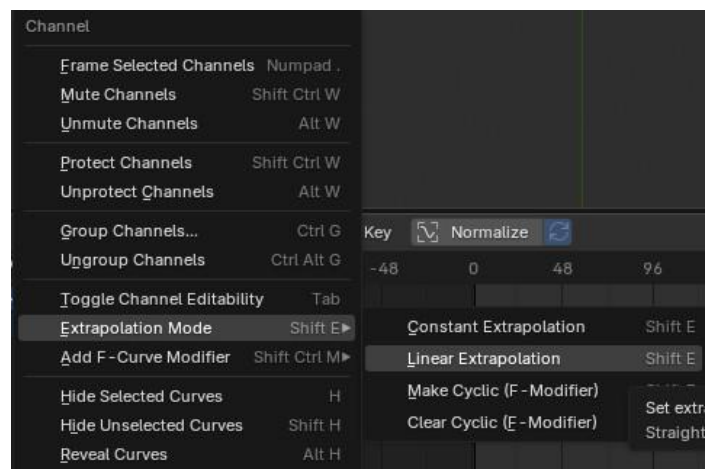
In order to set up constant velocity camera movement, select your camera and in “Graph Editor” control make Camera channel objects visible, then click with the right mouse button on the axis, along which camera is moving. In our case it’s “X Location”.

Virtual Scene Rendering

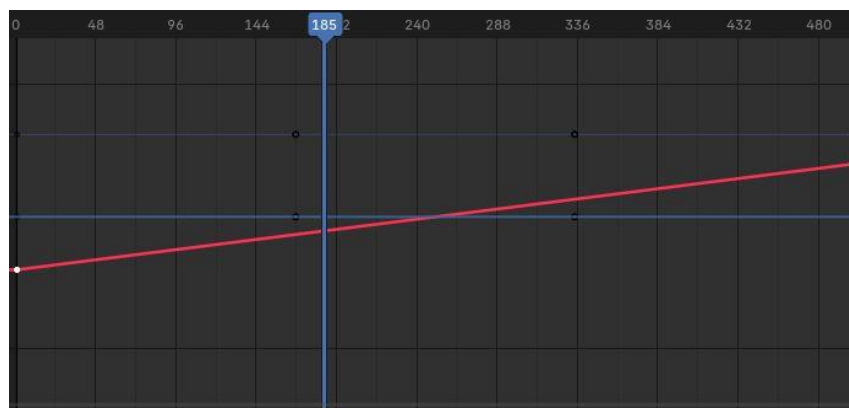
Instructions for Blender



Select Extrapolation Mode -> Linear Extrapolation:



Camera movement curve should look like this:



Now moving the “Timeline” control slider, you will see exactly what iLumogram viewer will see while walking in front of the iLumogram.

If you are satisfied with the scene’s setup – render it.