

# 'Facet Designer' - Newsletter 07

## EXPLORING THE 'BLACK HOLE'

We continue to study Tolkowsky's diamond, extending the discussion of Newsletter 05 by locating the sources of the 'black hole' we saw there. We saw this very strongly after only 3 reflections, so we use only 3 reflections here to simplify the study (minimum number of light source spots on the surface of the sphere).

We discovered that the 'black hole' has four parts.

### SETTING-UP THE LIGHT SPHERE

To get to the position shown in Figs 1 & 3, we did the following things (as described in Facet Tips # 04):

- 1) At *RayTracing* we selected the custom sphere (far right).
- 2) We colored *back* red and put our spot picture on *front*.
- 3) We turned the sphere 180° by dragging it at its equator (we are now looking at the pavilion side of the sphere).
- 4) We dragged the light 180°, along the equator of the sphere (now you can see the '180' in the middle of the sphere).
- 5) We moved the light spot to various spots on the black surface (maximized) and then looked at the 'normal' image of the crown to see where they appeared on the red surface.

### MAJOR PART of 'BLACK HOLE'

Fig.1 shows the spots that we found which cause the major part of the 'black hole'. The white spot was moved to cover one of a pair of spots; the corresponding 'bliki' on the crown of the stone is shown in Fig.2. It is a large 4-sided area of the 'hole'. The other spot of the pair makes its mirror image.

The bliki on the crown is almost directly over the source to the pavilion (straddling the same meridian). What path did this beam follow by 3 reflections?

### THE OTHER PART

Fig.3 shows another pair of light sources on the back side of the sphere; these produce tiny triangular areas on the crown image (Fig.4) to complete the kite-shaped 'black hole'. Here I have lit only one of them. In this case the sources are not directly in line with the bliki, but halfway between the meridians; additionally, the lower light source produces the upper bliki; this is definitely a 3-dimensional path in the gem.

### COMMENTS

This was not an important 'discovery' but it served to show what can be done with this new tool – should it ever be important to do so.

