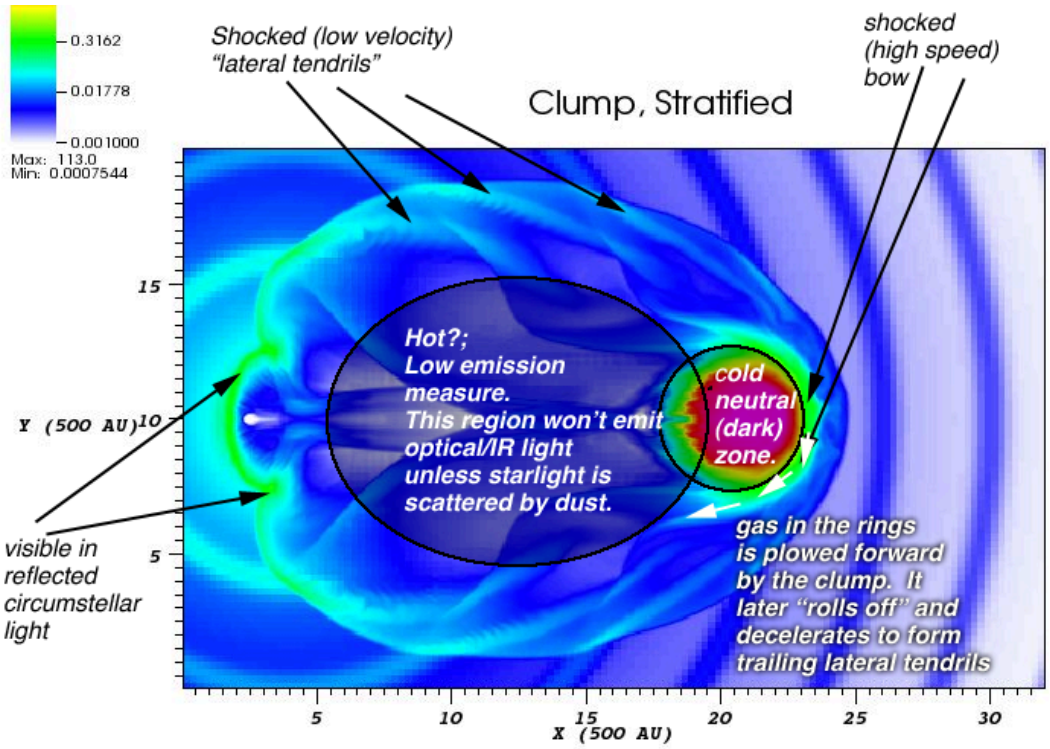
Notes on a discussion about CRL 618 with Martin 12:30 PDT 10 Feb:

In preparation for the paper we should seek to add structure to the following questions:
1. What are the key aspects of the observations that we hope that model will explain?
2. What are the key aspects of the model that future observations can evaluate?

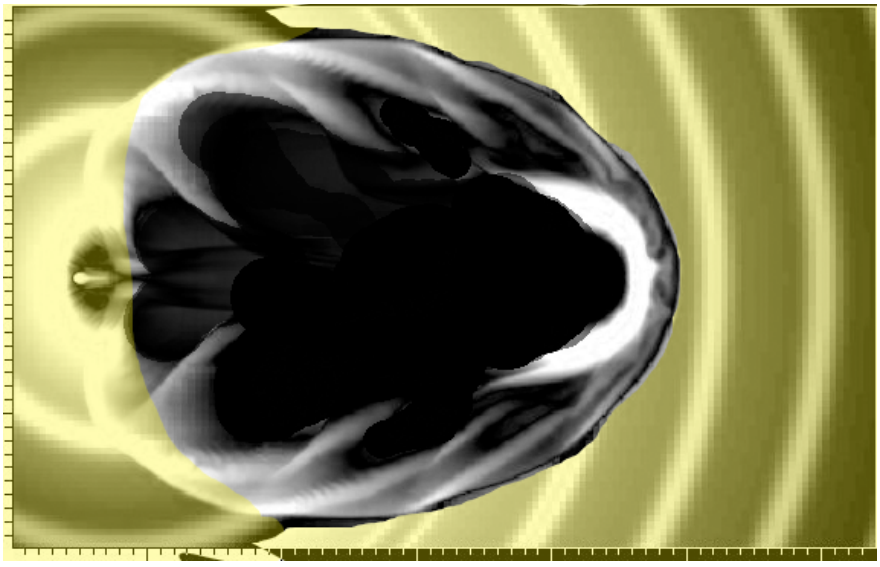
On question 1:
- are the fingers the result of clumps or jets
- what are the decisive results of the observations that bear on this?
- do the models suggest that the bullets or jets will decelerate as the encounter ambient gas?
- do the models predict that the jets will accelerate as they propagate through a medium of rapidly declining density?
- do the models account for the large-scale morphologies of the fingers of CRL618
- do the models account for the P-V diagrams of a pair of fingers CRL618 found in optical long-slit spectra by Sanchez-Contreras et al 2002?
(Fig 2, http://iopscience.iop.org/0004-637X/578/1/269/pdf/55888.web.pdf)
- do the models account for the observed striations in the fingers between the bright fingertips and the star?
- Are the rings of enhanced ambient gas seen in deep optical/IR images a sufficient condition for the formation of the striations? (Both the rings and striations have about the same periodicity.)
- Can we place constrains on the density or density distribution of the ambient medium? CO observations within ~2" of the central star suggest that the ambient particle density is = 5e6 (r/0."5)^2 -- but they are also consistent with a hole in the CO through which the fingers extend.
- DO the models explain the locations and shock speeds of the shocks (1) at the finger tips and (2) along the lateral edges of the fingers?
- do the models account for the time variations in the brightness of the fingertips by approx. factors of ten in a few years? (What's the radiative cooling time?)

On question 2:
1. The models predict how much ambient mass has been displaced by the passage of the bow shock. Can this be confirmed?
2. The models predict the structure of the launching zone. Can this be confirmed?
3. The models predict the shock speeds at the leading edge of the clump or jet? Can this be confirmed?
4. The models predict the shock speed of the radiating material in the trailing region of the bow shock. Can this be confirmed?
5. The models predict an evolving morphology for the fingers that is sensitive to the grand structure of the ambient medium that they disrupt. Aside from the rings, can we use the observed finger morphology to constrain this external density distribution?



After discussions with Martin today my understanding of the model is summarized above. Her I am assuming that the green area on the leading side of the clump is the recombination zone behind the shock.

This image is a 2-D slice. If we spun it into a 3-D solid and then projected it onto the sky it might look a lot like the HST images (except that they apply after a lot more time has elapsed in the model.)



Here's my guess about how the region would appear in narrow and broad filters. Shock-heated emission-line regions are white, regions of reflected starlight is in yellow.