Thanks for taking time for a discussion about the viewers and cameras in the injector. From what I understood, this is my summary of our discussion and action items. Please send me a note if there are things that I don't have correct here.

Viewers in the injector

8 camera/light assemblies upstream of the chopper

chopper viewer

7 viewers between chopper and gate

5 viewers between gate and linac

To do list:

8 cameras in the chopper upstream area

* Install zero length windows if they are not there already - Joe Gubeli has spares if we need to install before ours arrive
* New MDC light rings for all 8 viewers (Marcy to put in req)
* New cameras - lipstick style (Chris to put in req)
* Light ring support: machine from metal or 3D print with decent printer
* Camera support: 3D print from decent material - verify camera diameter since they vary
* Viewer parts needed, 7 each (replace 4 old, make 1 new, have 2 spares)
  + modified air cylinder
  + Top and bottom brackets
  + support rods
  + limit switches
  + electrical connection
  + mini flange with welded rod
* All viewers, internal parts (10x ordered)
  + new screen backplates,
  + new screen front plates
  + top hats for each viewer
  + Shaun has a new fixture to string wire on chromox viewers
  + 1x yag, reuse all chromox, need 1 more chromox screen (5 ordered in case of breakage)
  + Need to verify any required extension rods for non-standard viewer lengths

To do list:   
Remaining injector viewers

* Remove tube cameras and replace - Chris handling this
  + What does the replacement look like? Same as upstream?
* Any section of beamline that is vented, replace window with zero length (such as near FC1)