CME analysis Procedure

* Identify the CME and the start time. (The CME start time is the time it is first observed by any of the four coronagraphs)
* Observe all available coronagraph images in motion. Look for the same CME leading edge feature in various spacecraft.
* Look at EUV images in motion near the CME start time and identify the source location and any lower coronal signatures (post eruption arcade, dimming, rising loops, filament eruption).

Go to the StereoCAT: http://ccmc.gsfc.nasa.gov/analysis/stereo/

* Select two overlapping times for each spacecraft pair available. Times should be around 45-75 minutes apart, and try to choose times just before the CME leading edge has left the field of view. It is useful to refer back to the CME movies while selecting images.
* Perform plane of sky measurements CME leading edge and obtain triangulation results if appropriate. Determine final CME parameters (radial speed, half width, longitude, latitude, and time at 21.5 Rs (solar radii)).

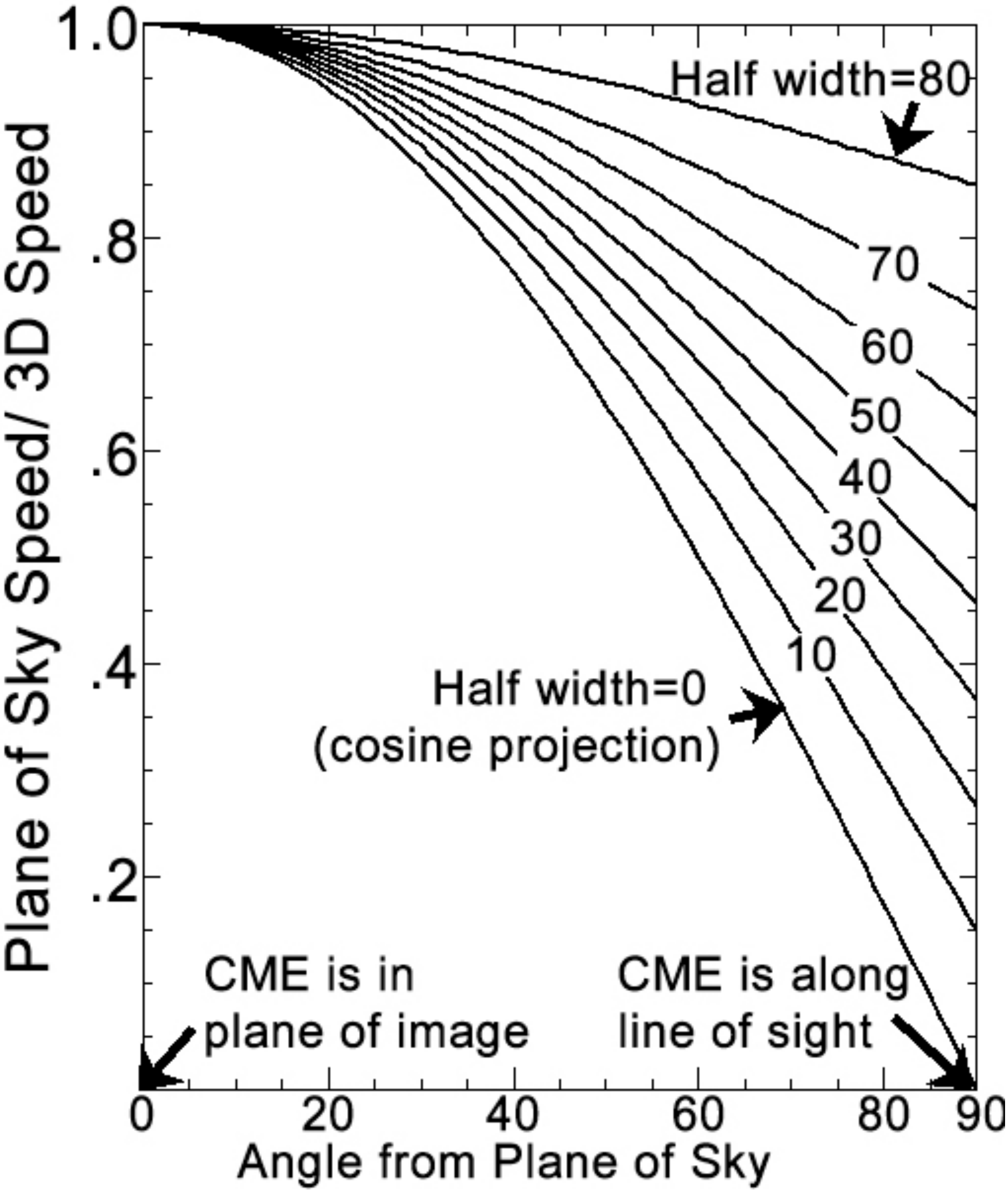
CME analysis tips/notes

* Make sure you are measuring the same feature in each spacecraft.
* If you cannot see the leading edge of the CME in image (halo), then it is not appropriate to use the triangulation method. In this case, estimate the plane of sky speed. It may be cautiously used for an asymmetric halo.
* Don't forget to determine the source location and signatures. Use these to assess the accuracy of your results (which spacecraft pairs will give the best results), or to derive the radial velocity from the plane of sky speed.
* Measure each CME about 10 times with various time and spacecraft pairs to get a feel for the parameters and the measurement error.
* The two selected times should be around 45-75 minutes apart for each spacecraft.
* The time between each spacecraft pair should be less than 10 minutes.
* Keep in mind that the goal is to determine the parameters at 21.5 Rs, not necessarily the fastest or earliest speed. Try to choose times just before the CME leading edge is closest to 21.5 Rs.
* Bear in mind that plane of sky speeds should always be lower than the derived radial velocity.

CME Analysis Resources & iSWA layouts

* StereoCAT: http://ccmc.gsfc.nasa.gov/analysis/stereo/
* 40 Frame coronagraph and EUV movies http://go.nasa.gov/16bTvzK
* Where is STEREO? http://stereo-ssc.nascom.nasa.gov/where.shtml
and http://stereo-ssc.nascom.nasa.gov/cgi-bin/make_where_gif
* Solar Images with grid overlays http://www.solarmonitor.org/

CME PROJECTION GRAPH



Single spacecraft mode

* If data from only one spacecraft is available, first measure the plane of sky speed
* Use the CME source location, signatures and qualitative information from other coronagraphs to determine the CME longitude
* Using this longitude, determine the angle the CME makes with the plane of sky (positive towards observer).
* If this angle is < 30 deg enter it at the bottom of the measurement screen, which does a simple cos(theta) approximation.
* If the angle compared to the plane of sky is larger, or the CME is very wide, use the CME projection graph to determine the approximate 3D speed:

- Use your width and source longitude to look up the ratio of the plane of sky speed to the true speed on the y axis.
- Divide your measured plane of sky speed by the ratio you looked up to obtain the true 3D speed.