Magellan Observations of E0102, July '09

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With support from:
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Las Campanas Observatory personnel
Magellan Telescopes

- Two 6.5 meter telescopes w/"active optics" (Schechter+ 2002).

- MIT has/allocates time: internal proposal submission and TAC:
  MIT list:  majordomo@space.mit.edu
  In the BODY of the message: subscribe magellan-mit

- http://www.lco.cl/lco/telescopes-information/magellan
Rooms/Lodge

LCO offices and labs
MagE Spectrometer

- Made at MIT. Uses a grating :-)  
  http://web.mit.edu/jjb/www/MASE.html
- 10" long slit, widths of, e.g., 0.7", 1.5"
- Resolving power ~ 4100 ( / slit_width)
- 10,000 to 3,000 Å!

*Figure 2. MagE optical design.*
Figure 3. Solar spectrum taken with MagE. The central wavelength of each order and the order number are indicated.
Magellan Clay dome

MagE
Clay control room

Harvard Prof.
X-Ray Velocities in E0102

HETG data, Ne X line:

Red ~ 900-1800 km/s
Green ~ -900 km/s
Blue ~ -1800 km/s

(Flanagan+ 2004)
E0102 Press Release '09

- http://chandra.harvard.edu/photo/2009/e0102/
Fig. 7.—Left: Three-color image, with the ACS 2003 [O iii] in green and the F775W filter in red. The 1999 Chandra image is represented in blue. Right: ACS 2003 epoch shown with contours from the 1999 Chandra image overlaid. The red contour marks the brightest X-ray emission and is coincident with the reverse shock, while the black contour outlines the faintest emission with the outer edge at the position of the forward blast wave. The X-ray and optical ejecta emissions correspond in many areas, but are also anticorrelated in several regions.
Optical Velocities

- Fabry-Perot narrow-band images/ing (Eriksen+ 2001)
- HST O III images (Finkelstein+ 2006)
- HST STIS ?
- FUSE O VI spectra (Sasaki+ 2006)
Optical Velocities ...

- Long-slit spectra (Tuohy & Dopita 1983)
  2"-wide, spaced 3" (E-W), 1000s, R ~ 600.
  Full v range: -2500 to +4000 km/s w.r.t. SMC.

3D ring model:
Slong-slit Observation

Courtesy of You-Hua Chu, Jan. 2004

Optical (CTIO)
MagE Slit Locations on E0102

Red = O, Ne X-ray Centers
Stars

Magellan proposal: Get more optical data!
But, wait, there's snow...
The next morning ...
MagE Slit Locations on E0102

"Centers" from Finkelstein+06:
- X-ray geometric,
- Proper motion

Red = O, Ne X-ray Centers
Stars

A1
A2
C2
C3
B7
B2
C8
A8

RA Offset [arc seconds, + is West]
Dec Offset [arc seconds, + is North]
HST view

Star T for reference
Guider-camera view

1.5" slit

Star T
$z \sim 6$ QSO (below 8000Å!) and night sky lines
E0102 - Al and SMC(?) and night sky lines
A1
A2
A3
A4
A5
A6
A7
A8
C2
C3
C4
C5
C6
C7
C8

$dv \sim 2900 \text{ km/s}$
$dv \sim 2900 \text{ km/s}$