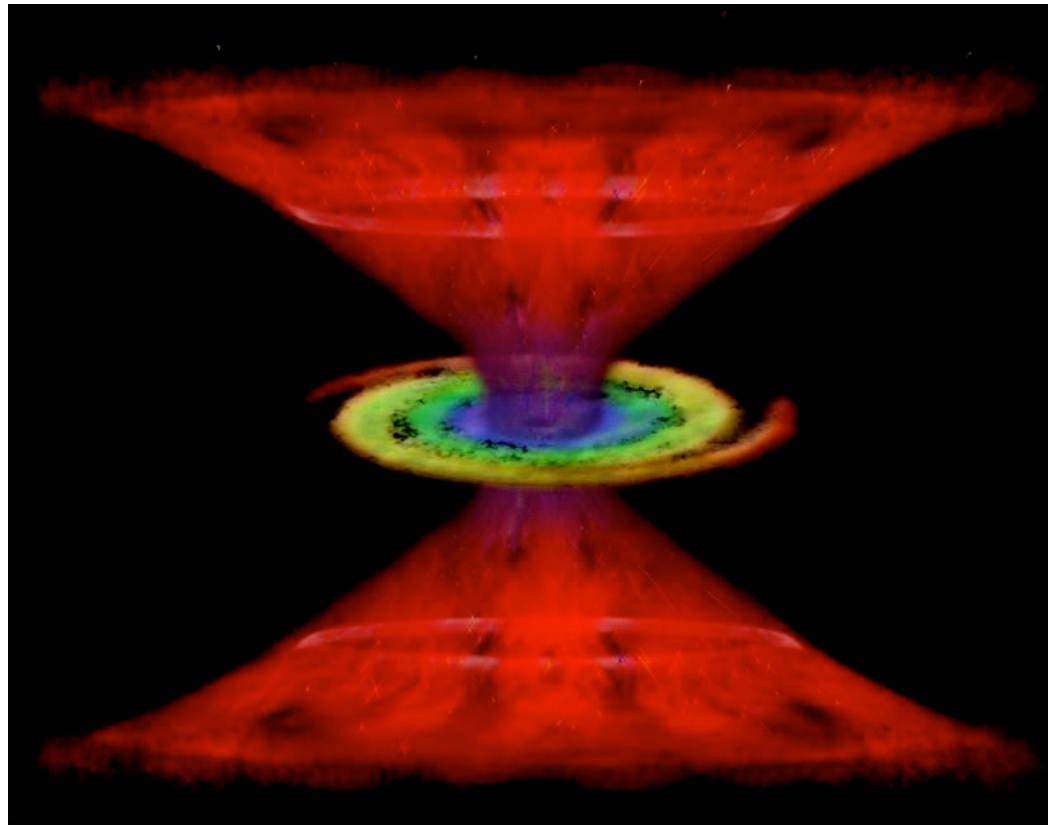
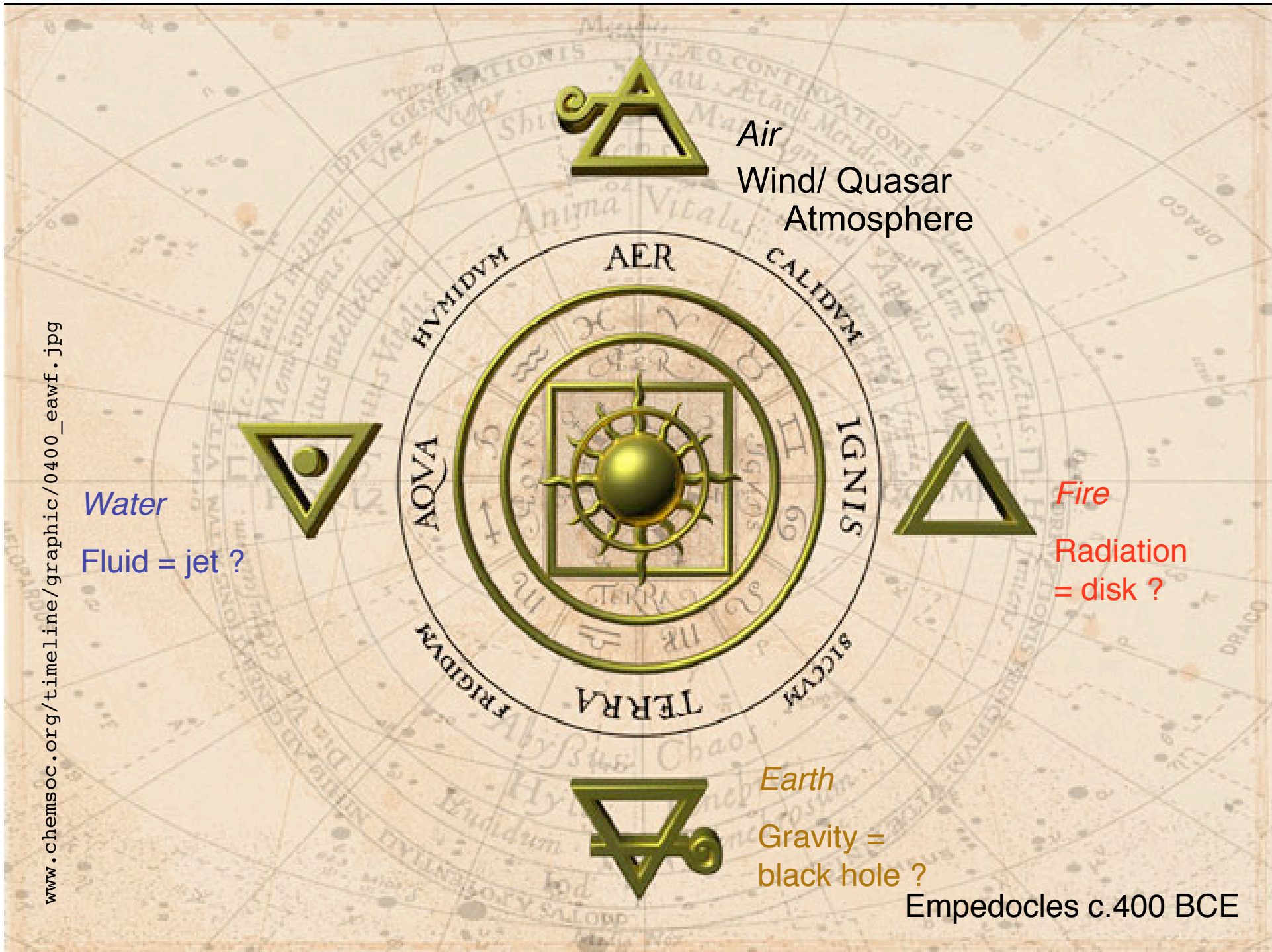


Disk Winds - tests?

Martin Elvis

Harvard-Smithsonian Center for Astrophysics





5 Chinese elements

- ❑ Culturally dependent: No Air - Wood & Metal instead
- ❑ Different elements in AGNs?



Elvis 2000: pluses, minuses

□ UV/X-ray connection

- FUSE, STIS partial covering, transverse; broader abs = edge-on [Kriss, Kaastra]
- location: disk or torus [M.E., Kriss, Kaastra]
- *WA variability. Higher X-ray resolution at $<1\text{keV}$ ($R\sim 5000$), need spectra in \sim hours.*

□ Funnel shape

- ‘Vertical’ region no pro or con? reverberation red/blue symmetry
- **Radial region - Compton ~ 1 wind: ASTRO-E2**
 - ✓ Spectropolarimetry: Ha PA, %polz’n [Axon, Kishimoto, Tadhunter]

□ Phases, pressure Equilibrium/continuous? [M.E., Kaastra, Collin].

- *BELR in wind?* NGC3227 abs’n event [McHardy]

□ 0.1c winds: part of disk wind? Only Edd.limited? Photosphere [Pounds, Reeves, Lawrence], UV blueshifts-smaller [O’Brien]

- *ASTRO-E2*

More Tests & challenges

❑ **eigenvector 1 = \dot{m} ?**

- Wind moves out, gets stronger at high \dot{m} ?
- SCAR: BH masses too low? [Collin]
- Variability - FWHM(H β) [McHardy]
- BAL quasars: radio-loudness v_{\max} link - \dot{m} ? [Wills]

❑ **large scale wind**

- NLR bi-cones? Opening angles? Matter or radiation bounded? [OIII] aligned w. radio [Schmitt]
- HI outflows: or radio jet cocoon? [Morganti, Beswick, Axon]
- How many ways to make type 2 AGNs? [M.E.]

❑ **Evolution:**

- Obscured population, vs z. [Simpson] Just a phase black holes go through?
- Star formation in disk [Nayakshin, Collin]
- Star formation/AGN link. Black hole growth. SCUBA [Alexander]
- Is a wind required for accretion to occur? [Fabian]

Black Hole Evolution

- ❑ Obscured population, vs z. [Simpson] Just a phase black holes go through?
- ❑ Star formation in disk. BELR abundances [Nayakshin, Collin]
- ❑ Star formation/AGN link. Black hole growth. SCUBA [Alexander]
- ❑ Is a wind required for accretion to occur? All AGNs have BELRs & so winds? [Fabian, M.E.]

Relativistic Fe-K Em. Lines

- Yes! [Fabian] $2r_g$
- No (mostly) [Reeves] $10r_g$ (?) if present
- Yes, but... Schwartzchild [Done] $6r_g$
- Yes, in spikes [Turner] $6-20r_g$
- ... or wind [Turner]

Pharos: A GRB Afterglow Mission

Martin Elvis (CfA), F. Fiore, F. Nicastro., astro-ph/xxxxxx

- MIDEX class mission
- $R > 5000$ X-ray Spectroscopy
 - Out of plane gratings
- $E < 0.87$ keV only
 - large area/mass ratio
- Rapid response
 - GRB afterglows
 - AGN monitoring
 - > **Warm Absorber**
 - location (from ionization, recombination)
 - dynamics
 - abundances
 - partial covering

X-ray Polarimetry

□ Diagnostic power for AGN & Quasar structure

- Where does the wind come from?
- What is the scattering mechanism?
- What is the geometry of AGN?

□ Polarimetry is photon hungry

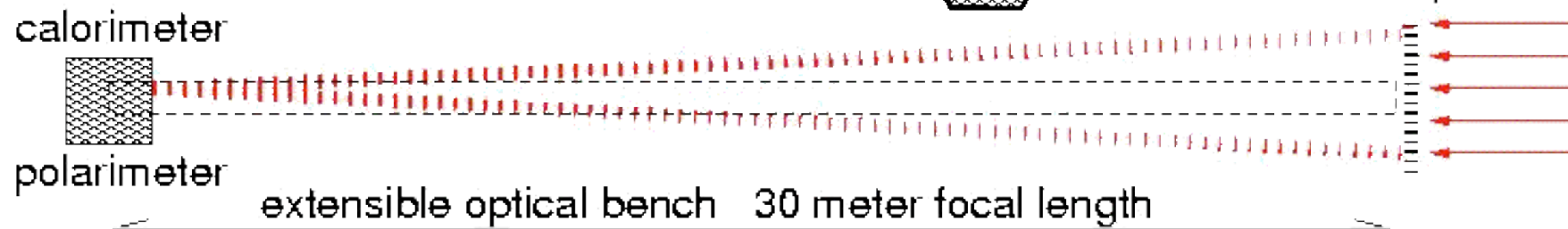
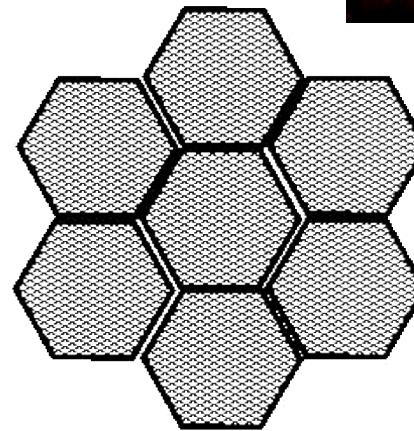
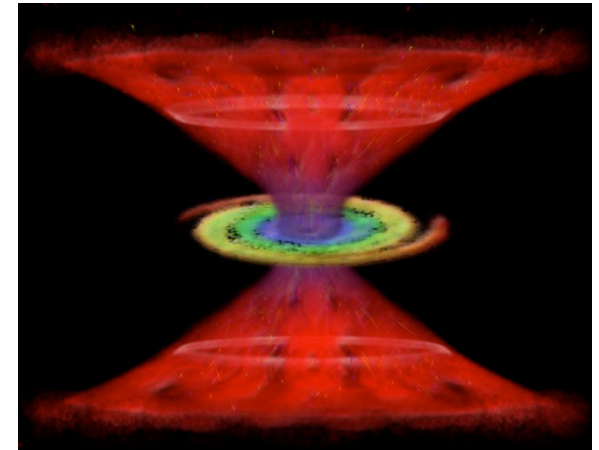
- 10^6 photons to measure 1% at 10s
- THINK BIG

□ MCP optics offer a solution

- square meters, yet MIDEX scale
- Link with fundamental physics

□ *Extreme Physics Explorer*

Elvis 2004, astro-ph/0403554



Fin

Thanks to Martin Ward
all organizers & speakers

Pat Russell

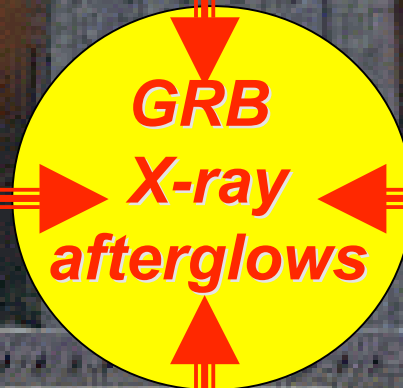
Ken Pounds

4 themes of early 21st Century astrophysics converge on Gamma ray burst afterglows

The most energetic events
in the Universe
1997 1st GRB redshift

The fate of the baryons
& Large Scale Structure
1999 1st WHIM simulations
2001 1st WHIM detection

Galaxies in the
Age of Star Formation
1997 Hubble Deep Field
GRB hosts



The Recombination Epoch
2000 Gunn-Peterson trough @ $z \sim 6$

Pressure Balance in X-ray absorbers

Krongold, Nicastro, Brickhouse, Elvis, Liedahl & Mathur, 2003 ApJ, in press. astro-ph/0306460

NGC 3783 Chandra HETG(MEG) spectrum solution		
Parameter	High Ionization	Low Ionization
Log U	0.76 +/- 0.1	-0.78 +/- 0.13
Log N_H cm⁻²	22.20 +/- 0.22	21.61 +/- 0.14
V_{turb} km s⁻¹	300 fixed	==300 fixed
V_{Out} km s⁻¹	788 +/- 138	738 +/- 138
T K	9.52 +/- 0.44 x 10 ⁵	2.58 +/- 0.39 x 10 ⁴
[Log T (K)]	5.98 +/- 0.02	4.41 +/- 0.07
Log T/U □ P	5.22 +/- 0.12	5.19 +/- 0.20
Log M(Hi/Lo)	4.85	
Log □	1.02 +/- 0.12	0.99 +/- 0.20

Free
parameters
in blue

If at same
distance

2-phase gas in pressure equilibrium