Evidence for the new scale in very low energy astrophysics:

The Tully Fischer Relation:

- Galaxies have flat rotation curves, with velocity V.
- Total luminosity L

$$CL = V^a \quad a = 3.9 \pm 0.2$$

- K = L/M (M-total mass)

$$CMK = V^4$$

- CK should be prop to G
- CK = Ga₀

$$a₀ = 1.2 \times 10^{-8} \text{ cm/sec}^2 = \sqrt{\Lambda} \cdot c^2/6$$

Figure 2: The near-infrared Tully-Fisher relation of Ursa Major spirals ((Sandiers & Verheijen 1998)). The rotation velocity is the asymptotically constant value. The velocity is in units of kilometers/second and luminosity in $10^{10} \text{ L}_\odot$. The unshaded points are galaxies with disturbed kinematics. The line is a least-square fit to the data and has a slope of $3.9 \pm 0.2$. 
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- Quantum Physics (quant-ph new, recent, abs, find)

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Mathematics

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- Mathematical Physics (math-ph new, recent, abs, find)
- Nuclear Experiment (nucl-ex new, recent, abs, find)
- Nuclear Theory (nucl-th new, recent, abs, find)
- Physics (physics new, recent, abs, find)
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Mathematics
Astrophysics

astro-ph new abstracts, Wed, 25 Aug 04 00:00:06 GMT
0408414 -- 0408454 received

astro-ph/0408414 [abs, ps, pdf, other] :

Title: Detectability of GRB Iron Lines by Swift, Chandra and XMM
Authors: L. J. Gou, P. Meszaros, T. R. Kallman

The rapid acquisition of positions by the upcoming Swift satellite will allow the monitoring for X-ray lines in GRB afterglows at much earlier epochs than was previously feasible. We calculate the possible significance levels of iron line detections as a function of source redshift and observing time after the trigger, for the Swift XRT, Chandra ACIS and XMM Epic detectors. For standard burst luminosities and decay rates and equivalent widths of 1 keV as previously reported, depending on the source-frame epoch at which the lines appear, Swift may be able to detect lines up to z~7 with a significance of better than 3 sigma. Equivalent widths of 0.5 keV should be detectable with better than 4.5 sigma at z up to ~8 by Chandra, and at z up to ~11 by XMM. For higher initial luminosities, as seen in some GRBs and as might be the case in population III bursts, similar significance levels are obtained out to substantially higher redshifts. For standard burst parameters, Chandra can distinguish between broad and narrow lines to better than 3 sigma up to z ~6, while Swift can do so up to z~0.5. For the higher luminosities, Swift is able to distinguish at the 5 sigma level between a broad and a narrow line up to z~3, and between a 6.7 keV vs. a 6.4 keV line center up to z ~5.

astro-ph/0408415 [abs, ps, pdf, other] :

Title: Detecting Dark Energy in Orbit -- the Cosmological Chameleon
Authors: Philippe Brax, Carsten van de Bruck, Anne-Christine Davis, Justin Khoury, Amanda Weltman
Comments: 31 pages, 6 figures

We show that there are no physically allowed non-minimal Second-Order Gauge invariant models of dark energy that evade the observational constraint from SN Ia of dark energy that is close to the critical density.
observing time after the trigger, for the Swift XRT, Chandra ACIS and XMM Epic detectors. For standard burst luminosities and decay rates and equivalent widths of 1 keV as previously reported, depending on the source-frame epoch at which the lines appear, Swift may be able to detect lines up to z \approx 7 with a significance of better than 3 sigma. Equivalent widths of 0.5 keV should be detectable with better than 4.5 sigma at z up to \approx 8 by Chandra, and at z up to \approx 11 by XMM. For higher initial luminosities, as seen in some GRBs and as might be the case in population III bursts, similar significance levels are obtained out to substantially higher redshifts. For standard burst parameters, Chandra can distinguish between broad and narrow lines to better than 3 sigma up to z \approx 6, while Swift can do so up to z \approx 0.5. For the higher luminosities, Swift is able to distinguish at the 5 sigma level between a broad and a narrow line up to z \approx 3, and between a 6.7 keV vs. a 6.4 keV line center up to z \approx 5.

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Authors: Philippe Brax, Carsten van de Bruck, Anne-Christine Davis, Justin Khoury, Amanda Weltman
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We show that the chameleon scalar field can drive the current phase of cosmic acceleration for a large class of scalar potentials that are also consistent with local tests of gravity. These provide explicit realizations of a quintessence model where the quintessence scalar field couples directly to baryons and dark matter with gravitational strength. We analyze the cosmological evolution of the chameleon field and show the existence of an attractor solution with the chameleon following the minimum of its effective potential. For a wide range of initial conditions, spanning many orders of magnitude in initial chameleon energy density, the attractor is reached before nucleosynthesis. Surprisingly, the range of allowed initial conditions leading to a successful cosmology is wider than in normal quintessence. We discuss applications to the cyclic model of the universe and show how the chameleon mechanism weakens some of the constraints on cyclic potentials.

astro-ph/0408416 [abs, ps, pdf, other]:

Title: Low angular momentum accretion-outflow model of flares from Sgr A*
Authors: Tapas K. Das, Bozena Czerny
Comments: Submitted to MNRAS Letters. 5 pages, 4 figures

We employ a low angular momentum accretion-outflow scenario to model the flares emanating out from the central region of Sgr A*. The primary donor for matter accreting onto the central SMBH of Sgr A* is assumed to be the WR star IRS 13 E3. We analytically calculate the specific energy and angular momentum density of stellar wind originating from IRS 13 E3 and study the dynamics that wind down to the very close vicinity of the central SMBH of Sgr A*. We show that on the way to the Galactic centre, such wind-fed accretion may encounter standing shocks and such shock drives outflow from the close vicinity of the SMBH. Matter content of such outflow is computed and it is argued that such outflow is responsible for production of the Galactic centre flares. We then self-consistently compute the luminosity \( L \) (and
We present radial velocity and new interferometric measurements of the double star Atlas, which permit, with the addition of published interferometric data, to precisely derive the orbital parameters of the binary system and the masses of the components. The derived semi-major axis, compared with its measured angular size, allows to determine a distance to Atlas of 132±4 pc in a purely geometrical way. Under the assumption that the location of Atlas is representative of the average distance of the cluster, we confirm the distance value generally obtained through main sequence fitting, in contradiction with the early Hipparcos result (1183±3.5 pc).

astro-ph/0408431 [abs, ps, pdf, other]:

Title: Formation of omega Centauri by tidal stripping of a dwarf galaxy
Authors: Makoto Ida, Junichiro Makino
Comments: 14 pages, 2 tables, 4 figures. Submitted to ApJL

We have investigated whether or not a tidal stripping scenario can reproduce the observed surface brightness profile of omega Centauri using N-body simulations. Assuming that the progenitor of omega Centauri is a dwarf elliptical galaxy, we model it with a King model with a core radius being the same as that of omega Centauri. We consider two different models of the Milky Way potential: a singular isothermal sphere and a three-component model. The progenitor dwarf is expressed as an N-body system, which orbits in the fixed Galactic potential. The dwarf lost more than 90 per cent of its mass during the first few pericenter passages. Thereafter, the mass remains practically constant. The final surface density profile is in good agreement with the observational data of omega Centauri, if the pericenter distance of the orbit of the progenitor dwarf is around 500 pc. This value is within the error bar of the current proper motion data of omega Centauri and Galactic parameters. Our simulation strongly suggests that the current density profile of omega Centauri is nicely reproduced by a tidal stripping scenario, in other words, that omega Centauri is a stripped dwarf elliptical.

astro-ph/0408432 [abs, ps, pdf, other]:

Title: Optical and near infrared observations of V1647 Ori and McNeil’s Nebula in February-April 2004
Comments: 11 pages, 8 figures, submitted to Astronomy and Astrophysics on 23 July, 2004

We combine our photometric and near infrared spectroscopic observations of the outburst star V1647 Ori with published data in order to make
astro-ph new abstracts, Wed, 25 Aug 04 00:00:06 GMT
0408414 -- 0408454 received

astro-ph/0408414 [abs, ps, pdf, other]:

Title: Detectability of GRB Iron Lines by Swift, Chandra and XMM
Authors: L. J. Gou, P. Meszaros, T. R. Kalman

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astro-ph/0408415 [abs, ps, pdf, other]:

Title: Detecting Dark Energy in Orbit -- the Cosmological Chameleon
Authors: Philippe Brax, Carsten van de Bruck, Anne-Christine Davis, Justin Khoury, Amanda Weltman
Comments: 31 pages, 6 figures

We show that the cosmological model of brane-worlds can be characterized by a scalar field potential, that provide an alternative to cold dark matter, which is potentially observable from space.
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1. astro-ph/0408450 [abs, ps, pdf, other]

   Title: Dark energy and supermassive black holes
   Authors: Pedro F. Gonzalez-Diaz (IMAFF, CSIC, Madrid)
   Comments: 13 pages, RevTex, accepted for publication in Phys. Rev. D

2. astro-ph/0408326 [abs, ps, pdf, other]

   Title: Nuclear Spirals and Supermassive Black Holes
   Authors: H. B. Ann, Panjait Thakur (Pusan National University, Korea)

3. astro-ph/0408166 [abs, ps, pdf, other]

   Title: The Environmental Impact of Supermassive Black Holes
   Authors: Abraham Loeb (Harvard)
4. astro-ph/0407512 [abs, ps, pdf, other] :

Title: Black hole growth by accretion
Authors: Smita Mathur, Dirk Grupe (Ohio State)
Comments: Submitted to A&A Research Notes

5. astro-ph/0407501 [abs, ps, pdf, other] :

Title: Why the astrophysical Black Hole Candidates are not rotating black holes
Authors: Abhas Mitra (NRL, BARC, India)
Comments: 9 pages

6. astro-ph/0407440 [abs, ps, pdf, other] :

Title: Stability of primordial black holes
Authors: Yoshiyuki Takahashi
Comments: Phys Rev D (submitted)

7. astro-ph/0406550 [abs, ps, pdf, other] :

Title: The Ecology of Black Holes in Star Clusters
Authors: Simon Portegies Zwart

8. astro-ph/0406260 [abs, ps, pdf, other] :

Title: Supermassive black holes from primordial black hole seeds
Authors: Norbert Duerchling
Comments: 8 pages, 3 figures
9. astro-ph/0406005 [abs, ps, pdf, other] :

Title: Black Holes and Ultrarelativistic Particles
Authors: C. Chicone, B. Mashhoon
Comments: 9 pages, 3 figures, submitted for publication

10. astro-ph/0405253 [abs, ps, pdf, other] :

Title: Supermassive Black Holes in Spiral Galaxies
Authors: Duccio Macchetto (ESA/STScI)

11. astro-ph/0405113 [abs, ps, pdf, other] :

Title: Black Hole Induced Ejections
Authors: G. Pelletier (LAOG/IUF Grenoble France)
Comments: 26 pages, draft version of the invited paper for the book "Dynamics and dissipation in electromagnetically dominated media" (Nova Science) edited by M. Lyutikov

12. hep-th/0404216 [abs, ps, pdf, other] :

Title: Accretion of Ghost Condensate by Black Holes
Authors: Andrei V. Frolov
Comments: 5 pages, 3 figures, REVTeX 4.0, discussion expanded

13. hep-th/0404096 [abs, ps, pdf, other] :
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1. hep-th/0406202 [abs, ps, pdf, other]
   Title: The Gravitational Instability of the Vacuum: Insight into the Cosmological Constant Problem
   Authors: Stephan Alexander, Manasse Mbonye, John Moffat
   Comments: 13 Pages

2. hep-th/0403069 [abs, ps, pdf, other]
   Title: Leptogenesis from Gravity Waves in Models of Inflation
   Authors: Stephan H. S. Alexander, Michael E. Peskin, M. M. Sheikh-Jabbari
   Comments: 11 pages, 0 figures, references added, estimates adjusted

3. hep-th/0309045 [abs, ps, pdf, other]
   Title: Quantum Gravity and Inflation
   Authors: Stephan Alexander, Justin Malecck, Lee Smolin
   Comments: 18 Pages, 2 Figures; major corrections to equations but prior results still hold, updated references

4. hep-th/0302160 [abs, ps, pdf, other]
   Title: Non-Topological Inflation from Embedded Defects
   Authors: Stephan Alexander (SLAC and Stanford ITP), Robert Brandenberger (Brown), Moshe Rozali (UBC)
   Comments: A few references added
Evidence for the new scale in very low energy astrophysics:

The Tully Fischer Relation:

- Galaxies have flat rotation curves, with velocity $V$
- Total luminosity $L$

$$CL = V^a \quad a = 3.9 \pm 0.2$$

- $K = L/M$ (M-total mass)

$$CKM = V^4$$

- $CK$ should be prop to $G$
- $CK = Ga_0$

$$a_0 = 1.2 \times 10^{-8} \text{ cm/sec}^2 = \sqrt{\Lambda \ c^2/6}$$

Figure 2: The near-infrared Tully-Fisher relation of Ursa Major spirals ((Sanders & Verheijen 1998)). The rotation velocity is the asymptotically constant value. The rotation velocity is given in units of kilometers/second and luminosity in $10^{10} L_\odot$. The unshaded points are galaxies with disturbed kinematics. The line is a least-square fit to the data and has a slope of $3.9 \pm 0.7$. 