ESTUDO DOS TRÂNSITOS DE HD209458b

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Neste trabalho, analisamos um conjunto de curvas de luz do trânsito de HD209458b obtidas com o telescópio de 28cm no mini-observatório do INPE e com os telescópios de 60cm do OPD/LNA. Apresentamos um método para a obtenção do instante central do trânsito baseado na correlação cruzada dos dados experimentais com um gabarito criado a partir das observações de alta relação sinal/ruído do Telescópio Espacial. Apresentamos uma efeméride refinada para os trânsitos e um valor obtido para o período orbital. Apresentamos também uma discussão a respeito da qualidade do perfil médio da curva de luz do trânsito obtida através de nossas observações e a descrição dos métodos de aquisição e redução dos dados, tendo em vista a familiarização e aprimoramento para futuras buscas e estudos de outros trânsitos planetários.

UMA CONEXÃO ENTRE O SEMI-EIXO MAIOR DOS PLANETAS GIGANTES GASOSOS EXTRA-SOLARES E METALICIDADE ESTELAR

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Apresentamos um modelo que correlaciona a metalicidade estelar com o semi-eixo maior de seu planeta mais massivo, considerando que o mecanismo de acresção nucleada governa a formação de planetas gigantes gasosos. O modelo prevê que a região de formação ótima desloca-se radialmente para fora do disco protoplanetário com o aumento da metalicidade estelar, o que oferece uma explicação para a ausência de planetas extra-solares com longas órbitas ao redor de estrelas de baixa metalicidade. Utilizando o espaço amostral disponível de planetas extra-solares, construímos uma estimativa da curva de formação planetária em função da metalicidade, que batizamos de Órbitas Planetárias de Idade Zero (ZAPO). O modelo também sugere que a pequena freqüência de planetas orbitando estrelas de metalicidade baixa pode ser causada em parte pela maior eficiência de destruição durante o processo de migração, visto que neste caso os planetas se formariam inicialmente mais próximos de suas estrelas centrais.

SAB

PLASMAS E ALTAS ENERGIAS

OBSERVATIONS OF RECENT BURSTS AND HIGHLIGHTS OF THE HETE-2 MISSION

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The HETE-2 satellite was successfully launched into equatorial orbit on 9 October 2000 and is the first space mission entirely devoted to the study of gamma-ray bursts (GRBs). HETE-2 utilizes a matched suite of low energy X-ray, medium energy X-ray, and gamma-ray detectors mounted on a compact spacecraft. A unique feature of the mission is its capability for localizing GRBs with ?1-10' accuracy in real time aboard the spacecraft. GRB locations are transmitted, within seconds to minutes, directly to a dedicated network of

telemetry receivers at 13 automated "Burst Alert Stations" (BAS) sited along the satellite ground track. One of these stations is located at Natal, RN. The BAS network re-distributes the GRB locations world-wide to all interested observers via Internet and the GRB Coordinates Network (GCN) in a typical time scale of a few seconds. Thus, prompt optical, IR and radio follow-up identifications can be made for a large fraction of the GRBs discovered by HETE-2. Here we present recent observations of GRBs by HETE-2, as well as the main scientific highlights of the mission. GRB041006, at a redshift of 0.7, was rapidly located by HETE-2 and has shown a light curve bump very similar to SN1998bw, strengthening the case for hypernova/GRB association. GRB040924 was the first short (soft) burst for which an optical afterglow was observed. HETE-2 also detected a very soft GRB (actually an X-ray Flash – XRF), GRB040701X, giving support to the mounting evidence that GRBs and XRFs are the same phenomenon. The mission has contributed so far with about 50 precise localizations of GRBs which led to important obrservations of optical and radio afterglows. HETE-2 has confirmed the connection between GRBs and Type Ic supernovae and has provided evidence that the isotropic-equivalent energies and luminosities of GRBs may be correlated with redshift. HETE-2 has also placed severe constraints on X-ray and optical afterglows of short GRBs and has contributed to the study of "optically dark" bursts and the nature of X-ray flashes.

PROBING MAGNETO-CENTRIFUGAL SCENARIOS FOR JET PRODUCTION

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Highly collimated supersonic jets are observed to emerge from a wide variety of astrophysical objects. They are seen in young stellar objects (YSOs), compact objects (such as galactic black holes or microquasars, and X-ray binary stars), and in the nuclei of active galaxies (AGNs). Despite their different physical scales (in size, velocity, and amount of energy transported), they have strong morphological similarities suggesting a common mechanism for their origin. What is this universal mechanism? In this work, we will discuss the currently most accepted model for jet production which is based on the *magneto-centrifugal* acceleration out off a magnetized accretion disk that surrounds the central source and then will show recent results based upon observations, numerical simulations, and analytical study that support this model (Cerqueira & de Gouveia Dal Pino 2004, A&A, 426, L25; de Gouveia Dal Pino & Lazarian 2005, A&A).

GIANT FLARES IN SOFT GAMMA REPEATERS: EVIDENCE FOR THE BIRTH OF STRANGE STARS?

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Soft gamma-ray repeaters (SGRs) are X-ray stars which emit numerous short duration (about 0.1 s) bursts of photons up to 100 keV during sporadic active periods. On 2004 December 27, a giant flare from the Soft Gamma-ray Repeater SGR 1806-20 has been discovered with the INTEGRAL gamma-ray observatory and detected by many other satellites. The short (0.2 s) initial pulse was so strong to saturate almost all the detectors for during the first ?500-700 ms interval after the onset. However, one of the particle detectors on GEOTAIL was not saturated and provided unique measurements of the hard X-ray intensity and the profile for the first 600 ms interval with 5.48 ms time resolution. The most striking difference between the outburst of SGR 1806-20 and the giant flares previously observed from SGRs is the global energetics of the event. The hard X-ray fluence in the SGR 1806-20 initial spike implies an isotropic-equivalent energy release of several $10^{44} d^2_{15kpc} erg$. This is at least two orders of magnitude larger than that of the giant flares of previous sources. The following ?400 s long tail, modulated at the neutron star rotation period of 7.56 s, had a fluence of 2.6?$10^{-4} erg\ cm^{-2}$ above 80 keV, which extrapolating to lower energies corresponds to an emitted energy of 1.6?$10^{44} d^2_{15kpc} erg$ at $E>3$ keV. The initial gamma-ray spike had a blackbody spectrum characteristic of a relativistic pair/photon outflow. We argue that this event can be associated with the *asymmetric core combustion* of a highly magnetized (B ?10^{13} G) neutron star into strange quark matter. We find that the initial gamma-ray spike is associated with a prompt asymmetric phase of the combustion and lasts ?0.2 s as observed. It is then followed by a further, less luminous and more symmetric emission, with a much larger timescale (about 300 s) which is controlled by the velocity of the combustion process and the neutrino cooling of the hot quark star. The amplitude periodicity in the emission is explained by the fact that the injection of energy has a preferential direction along the (rotating) magnetic poles.