



Centre de Recherche en Astrophysique du Québec

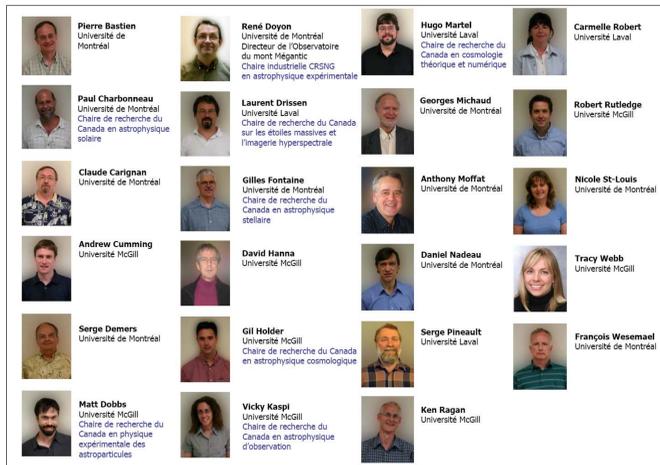
Centre for Research in Astrophysics of Québec



Who we are

The Centre for Research in Astrophysics of Québec (CRAQ) brings together the 25 astrophysicists from the Université de Montréal, McGill University and Université Laval. The CRAQ constitutes a unique grouping of researchers in astrophysics in Québec bent on excellence and whose varying and complementary fields of expertise allows us to be innovative, creative and competitive in several scientific fields, thus offering graduate students a wide variety of subjects in both fundamental and applied fields of research. It is one of the 37 «Regroupements stratégiques» funded by the *Fonds Québécois de recherche sur la nature et les technologies*.

The CRAQ also includes **15 postdocs, 37 PhD and 42 Master's students, 17 associate members and researchers, and 6 technicians.**



Our mission is to :

- **Promote excellence** in astrophysics in Québec and help Québec astronomy shine on the world stage
- **Insure teaching** at the graduate level and train highly skilled students in astrophysics
- **Help engrain** this field of knowledge within the popular culture of Québec
- **Consolidate** the material and financial resources of its members for cutting edge research

CRAQ Science Highlights

Direct Imaging of Multiple Planets Orbiting the Star HR 8799
Christian Marois,^{1,2,3*} Bruce Macintosh,² Travis Barman,⁴ B. Zuckerman,⁵ Inseok Song,⁶ Jennifer Patience,⁷ David Lafrenière,⁸ René Doyon⁹

Direct imaging of exoplanetary systems is a powerful technique that can reveal Jupiter-like planets in wide orbits, can enable detailed characterization of planetary atmospheres, and is a key step toward imaging Earth-like planets. Imaging detections are challenging because of the combined effect of small angular separation and large luminosity contrast between a planet and its host star. High-contrast observations with the Keck and Gemini telescopes have revealed three planets orbiting the star HR 8799, with projected separations of 24, 38, and 68 astronomical units. Multi-epoch data show counter clockwise orbital motion for all three imaged planets. The low luminosity of the companions and the estimated age of the system imply planetary masses between 5 and 13 times that of Jupiter. This system resembles a scaled-up version of the outer portion of our solar system.

HR 8799 Planetary System (Sept. 2008)

R. Doyon, D. Lafrenière, and C. Marois receiving the title of Scientists of the Year from Radio-Canada

Einstein was right, McGill astrophysicists say

Researchers at McGill University's Department of Physics – along with colleagues from several countries – have confirmed a long-held prediction of Albert Einstein's theory of general relativity, via observations of a binary-pulsar star system. Their results will be published July 3 in the journal *Science*. Pulsars are small, ultradense stellar objects left behind after massive stars die and explode as supernovae. They typically have a mass greater than that of our Sun, but compressed to the size of a city like Montreal. They spin at staggering speeds, generate huge gravity fields and emit powerful beams of radio waves along their magnetic poles. These illuminate Earth-based radio-telescopes like rotating lighthouse beacons as the pulsar spins. More than 1,700 pulsars have been discovered in our galaxy, but PSR J0737-3039A/B, discovered in 2003, is the only known double-pulsar system; that is, two pulsars locked into close orbit around one another. The two pulsars are so close to each other, in fact, that the entire binary could fit within our Sun. PSR J0737-3039A/B lies about 1,700 light years from Earth.

Astronomers discover stars with carbon atmospheres

November 21st, 2007

Artists' concept of the surface of the white dwarf star H1504+65, believed to have somehow expelled all its hydrogen and all but a very small trace of its helium, leaving an essentially bare stellar nucleus with a surface of 50 percent oxygen and 50 percent carbon. When this star cools, it may have a carbon atmosphere, like the stars newly found by University of Arizona, Canadian and French astronomers (Illustration credit: M. S. Siwinski and L. I. Slivinska of Lunarismaar) (Copyright photo by Siwinski, M. S. and Slivinska, L. I.)

News in Science

Found! Most massive stars so far
Larry O'Hanlon
Bloomberg.com

Friday, 8 June 2007

The two most massive stars ever discovered are a pair found recently in the southern Milky Way, an astronomy conference heard this week. The double, super-heavyweights are in orbit around each other, the scientists say.

While the previous record was a star with a mass 83 times that of the Sun, one of the new record breakers weighs in at a whopping 114 solar masses and its little brother is 84 solar masses.

The discovery was presented at the meeting of the Canadian Astronomical Society at the Royal Military College of Canada in Kingston, Ontario.

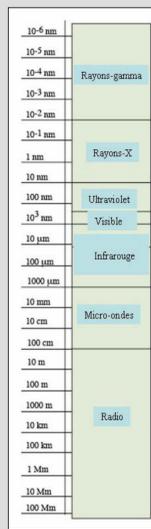
The two big bruiser stars, which form a binary system called A1, are not only large, they are quite young.

This makes sense since it is the largest and brightest of stars that live the briefest, according to stellar theory.

"Their age is about a million years," says astronomer Professor Anthony Moffat of the University of Montreal.

Laboratoire d'Astrophysique Expérimentale (LAE)

The LAE is responsible for the coordination of the development of astronomical instrumentation within the CRAQ.



Détecteurs de rayons gamma pour VERTIS

3D-NTT pour le New Technology Telescope au Chili

Galaxy Alpha Fabry-Perot Spectrometer¹ pour le William Herschel Telescope

Spectromètre à transformée de Fourier² pour l'Observatoire du mont Mégantic

Caméra Fabry-Perot FaNTOMM utilisée à l'OMM, au CFHT, à ESO, et à l'OHP

Systèmes de lecture pour les détecteurs bolométriques de EBEX et POLARBEAR

Polarimètre POL-2 au JCMT

Caméra infrarouge WIRCam¹ au CFHT

Gemini Planet Imager au télescope Gemini

Planet Formation Imager pour le TMT

Fine Guider Sensor et Tunable Filter pour le JWST

Caméra infrarouge à grand champ CPAPR et spectromètre infrarouge SIMON pour l'OMM et le Chili

Industrial Collaborators

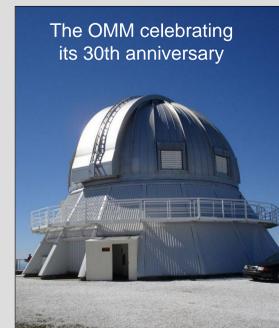
ABB, Photonics, INO, TELOPS, ImmerVision, COM DEV

Observatoire du mont Mégantic (OMM)

The OMM, built in 1977, is equipped with a Ritchey-Chrétien type telescope with a 1,6 m diameter mirror. It is located at the top of Mont Mégantic at an altitude of 1111 m. The OMM is used as a scientific instrument as well as for training graduate students. It also serves as a platform for the instruments developed by the LAE.



In 2007, the Parc National du Mont-Mégantic has been declared the first International Dark Sky Reserve



The OMM celebrating its 30th anniversary

Public outreach activities

Series of public conferences organized in collaboration with the Planétarium de Montréal

Terre 2.0 ?
La vie existe-t-elle ailleurs dans l'Univers... ?

Conférence de Robert Lamoignon, Directeur exécutif de l'Observatoire du mont Mégantic, Astrophysicien au département de Physique, Université de Montréal

Quand : Le 12 mars 2009 à 19h30
Où : Planétarium de Montréal, 1000 Saint-Jacques Ouest
Billets gratuits

Calendrier 2009 Ephémérides

Astronomical calendar (done by graduate students from the CRAQ)

Vous voulez VOIR le Big Bang ?
N'ajoutez pas votre appareil.

Le point de vue des physiciens théoriciens sur un sujet d'actualité scientifique: comment interpréter les données du langage des particules.

craq-astro.ca

Longue journée ?
Ça ne peut qu'empiéter!

Les membres invités par la Lave et le Réseau québécois de recherche en astronomie et en astrophysique ont le plaisir de vous présenter une conférence de vulgarisation.

craq-astro.ca

NOUS, POUSSIÈRES D'ÉTOILES !

Le samedi 9 juillet, 18h à 20h / Le samedi 13 juillet, 18h à 20h / Le samedi 17 juillet, 18h à 20h

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Our Web page <http://craq-astro.ca>

2009 ANNÉE INTERNATIONALE DE L'ASTRONOMIE

Le Centre de recherche en astrophysique du Québec (CRAQ) organise le Centre de l'Observatoire du Mont-Mégantic, de l'Université de Montréal, de McGill et de l'Université Laval.

Le Centre de l'Observatoire du Mont-Mégantic est un lieu unique pour les astronomes amateurs et professionnels. Il offre un accès à un télescope de 1,6 m de diamètre et à une salle de conférence.

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Active presence in the media

LES ANNÉES LUMIÈRE, DÉCOUVERTE, LE TÉLÉJOURNAL, 990, RDI, CBC NEWS