Gilles Ferrand

Research Scientist

RIKEN

Hello/Bonjour, my name is Gilles Ferrand /ʒil feʁɑ̃/, I am a French and Canadian astrophysicist currently working in Japan.
I have been studying the acceleration of particles by shock waves in supernova remnants, which are believed to be the main production sites of Galactic cosmic-rays (isolated or inside superbubbles). My work is mostly based on numerical simulations, that allow me to understand the complex interplay between the shock and the particles, and to predict the multi-wavelength emission that we observe from both. To help making comparisons with observations, I also made the first complete census of X-ray and gamma-ray observations of Galactic remnants. I am currently working on making the link between the modeling of supernova explosions and the modeling of supernova remnants, with a focus on the 3D morphology.
I have also a keen interest in scientific visualization, I have been exploring techniques for immersive visualization of 3D data cubes, with applications to both simulations and radio data.

Full curriculum vitae as PDF

Interests

- particle acceleration and the origin of cosmic rays
- supernova remnants as probes of the supernova engine
- scientific visualization, including immersive 3D

Education

- PhD in Astrophysics, 2008
  Université de Toulouse
- Master in Astrophysics, 2004
  Université Paris 7
- Master in Engineering, 2003
  École Centrale de Nantes

Research positions

Research Scientist

RIKEN

Sep 2016 – Present · Japan

From the supernova engine to the supernova remnant
Dr. Shigehiro Nagataki
Astrophysical Big Bang Laboratory (ABBL)
Interdisciplinary Theoretical and Mathematical Sciences Program (iTHEMS)

Research Associate

University of Manitoba

Jan 2016 – Jul 2016 · Canada

3D visualization of astronomical data using immersive Virtual Reality displays
Profs. Jayanne English and Pourang Irani
Department of Physics and Astronomy
Department of Computer Science, Human-Computer Interaction lab

Postdoctoral Fellow, CITA National Fellow

University of Manitoba

Sep 2010 – Dec 2015 · Canada

Particle acceleration in supernova remnants, using numerical simulations and high-energy observations
Prof. Samar Safi-Harb
Department of Physics and Astronomy, SNR group

researcher

CEA

Sep 2008 – Aug 2010 · France

Morphological and spectral evolution of supernovae remnants under the effect of efficient cosmic-ray acceleration
Dr. Anne Decourchelle
Astrophysics Division

Teaching experience

Sessional Instructor

University of Manitoba

Aug 2015 – Aug 2015 · Canada

Taught general physics to first year students

Attaché Temporaire d'Enseignement et de Recherche – ATER (lecturer)

Université Toulouse III

Aug 2008 – Sep 2007 · France

Taught science to undergraduate and graduate students

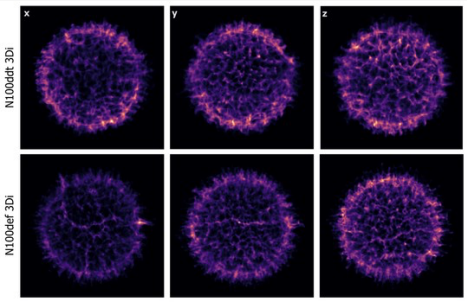
moniteur d'initiation à l'enseignement supérieur (teaching assistant)

Université Toulouse III

Aug 2007 – Oct 2004 · France

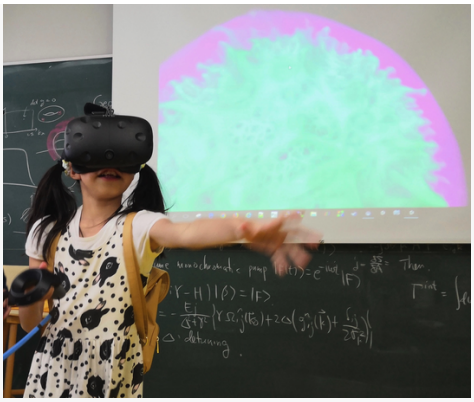
Taught science to undergraduate students

Main projects



SN2SNR

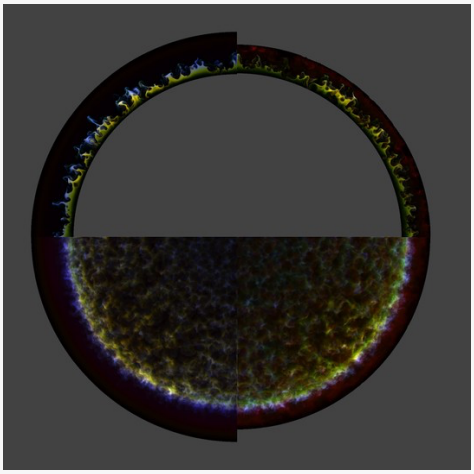
Using the 3D morphology of the supernova remnant as a probe of the explosion mechanism.



Virtual Reality

Exploring immersive 3D visualization for research and for outreach.

[VR/advanced viz group]



AccelRSN

Simulating the effects of efficient particle acceleration in supernova remnants.

SNRcat

An up-to-date catalogue of high-energy observations of all Galactic supernova remnants.

[snrcat.physics.umanitoba.ca]

Collaborations

CIRADA
The Canadian Initiative for Radio Astronomy Data Analysis

Cherenkov Telescope Array
The observatory for ground-based gamma-ray astronomy

Public lectures

2015-02-05 · University of Manitoba · panel discussion organized by aceart inc.

"Art & Astronomy: intersections and oppositions"

PDF

2014-11-20 · Oak Hammock Marsh Interpretive Centre · Astronomy Night

"Astrophotography: basics of imaging the night sky"

PDF

2011-08-07 · Royal Astronomical Society of Canada (RASC) · monthly meeting

"Supernova Remnants"

PDF

Some recent professional presentations

2019-08-06 · Hexi Hotel · international workshop Progenitors of Type Ia Supernovae

"From the thermonuclear supernova to the supernova remnant"

PDF

2019-08-02 · RIKEN · r-EMU first symposium

"From the supernova to the supernova remnant"

PDF

2019-06-12 · European Space Astronomy Centre (ESAC) · XMM-Newton Science Workshop “Astrophysics of hot plasma in extended X-ray sources”

"Modelling and simulations of supernova remnants"

PDF

2018-04-13 · RIKEN · iTHEMS coffee meeting

"Using Virtual Reality to communicate the science of supernovae and their remnants"

PDF

2017-11-07 · RIKEN · international workshop Theories of Astrophysical Big Bangs

"3D simulations of young supernova remnants"

PDF

2016-06-09 · Minoa Palace Resort · international conference Supernova Remnants: An odyssey in space after stellar death

"3D simulations of young supernova remnants with efficient particle acceleration: thermo-nuclear vs. core-collapse"

PDF

Publications

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