A network of radio-telescopes for classrooms

EUHOUMW Hands-On Universe, Europe. Connecting classrooms to the Milky Way

510308-LLP-2010-1-FR-COMENIUS-CMP

Anne-Laure Melchior

(LERMA, UPMC, France)

EUHOU coordinator

for EUHOUMW partnership

http://www.euhou.net/

Lifelong Learning

EU-HOU
Hands-On Universe, Europe
Bringing frontline interactive astronomy to the classroom

UPMC SORBONNE UNIVERSITÉS

- **Outreach** for **science teachers** in **secondary schools**
- Development of **pedagogical tools** based on **astronomical data**
- Use astronomy for **science teaching**

- **Frontline** research topics
- **Multilingual** approach
- Reach a **large number** of pupils

Since 2004...

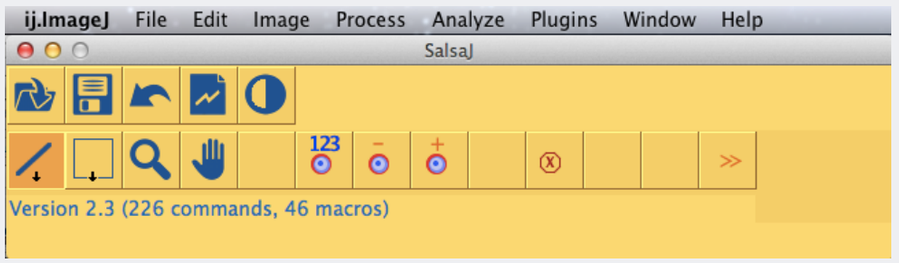
510308-LLP-2010-1-FR-COMENIUS-CMP / 2012-4028;
141928-LLP-1-2008-1-FR-COMENIUS-CMP / 2008-3371;
113969-CP-1-2004-1-FR-MINERVA-M).

Up to 15 partner countries involved

Silver award 2009

Innovation and Creativity in the Lifelong Learning Programme: Create, Innovate and Cooperate (EC)

SalsaJ series of exercises: from data to physics



A multilingual software for education: analysis of images and spectra

20 EUHOU training sessions for European teachers

Support from Discover The Cosmos and GTTP

EUHOUMW Connecting classrooms to the Milky Way

Partnership

FRANCE - UPMC- Project coordinator

BELGIUM - Royal Observatory of Belgium/Planetarium of Brussels
Contact: Rodrigo Alvarez

CYPRUS - Saint Nikolas Lyceum
Contact: Maria Loizou-Theodosiou

GERMANY - Förderverein Astropeiler Stockert e.V. F.A.S.
Contact: Wolfgang Herrmann

GREECE - Institute for Space Applications and Remote Sensing, National Observatory of Athens
Contact: Eleni Chatzichristou

POLAND - Jagiellonian University
Contact: Krzysztof Chyzy

PORTUGAL - NUCLIO – Interactive Astronomy Nuclei
Contact: Rosa Doran

ROMANIA - University of Craiova
Contact: Radu Constantinescu

SPAIN - Complutense University of Madrid
Contact: Ana I. Gómez de Castro

SWEDEN - Stockholm House of Science
Contact: Cecilia Kozma

UNITED KINGDOM - University of Glamorgan
Contact: Sarah Roberts

Credits: http://europa.eu/abc/maps

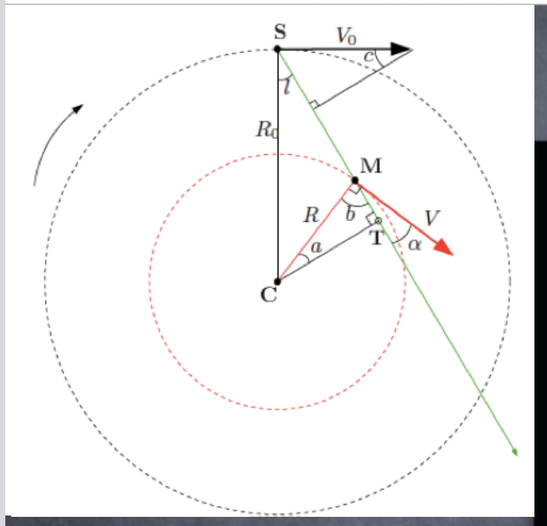
Challenge: how to use HI 21cm radioastronomy in secondary schools

- Technical multilingual tools adapted to pupils: **five T3m radiotelescopes installed in 5 EU countries**, a **Web interface** to **remotely** control them and **observe**, a **simulator** of HI observations, **archives**, **on-line tools** to analyse the data.
- Pedagogical support material: **teacher manual, videos, podcasts**
- Pedagogical activities: **kinesthetic activity** to teaching modelling concepts
- Outreach material: **exhibition (10xA0 in 11 languages)**

Kinesthetic activity introduced to secondary school teachers

EUHOU teacher training in Paris 2012

$$V_r = V\frac{R_0}{R}\sin l - V_0 \sin l.$$



Try: V ~ Vo or V ∝ R

Vr = Vo (Ro/R−1) sin l

R < Ro

Quadrant I

0°< l < 90°

l=0deg

Quadrant IV

270°< l < 360°

sin l > 0

sin l < 0

Vr > 0

Vr < 0

Illustration courtesy: NASA/JPL-Caltech/R. Hurt

Sagittarius Arm

Norma Arm

Scutum-Centaurus Arm

Perseus Arm

Outer Arm

Galactic rotation

l=90deg

Sun

l=270deg

Quadrant II

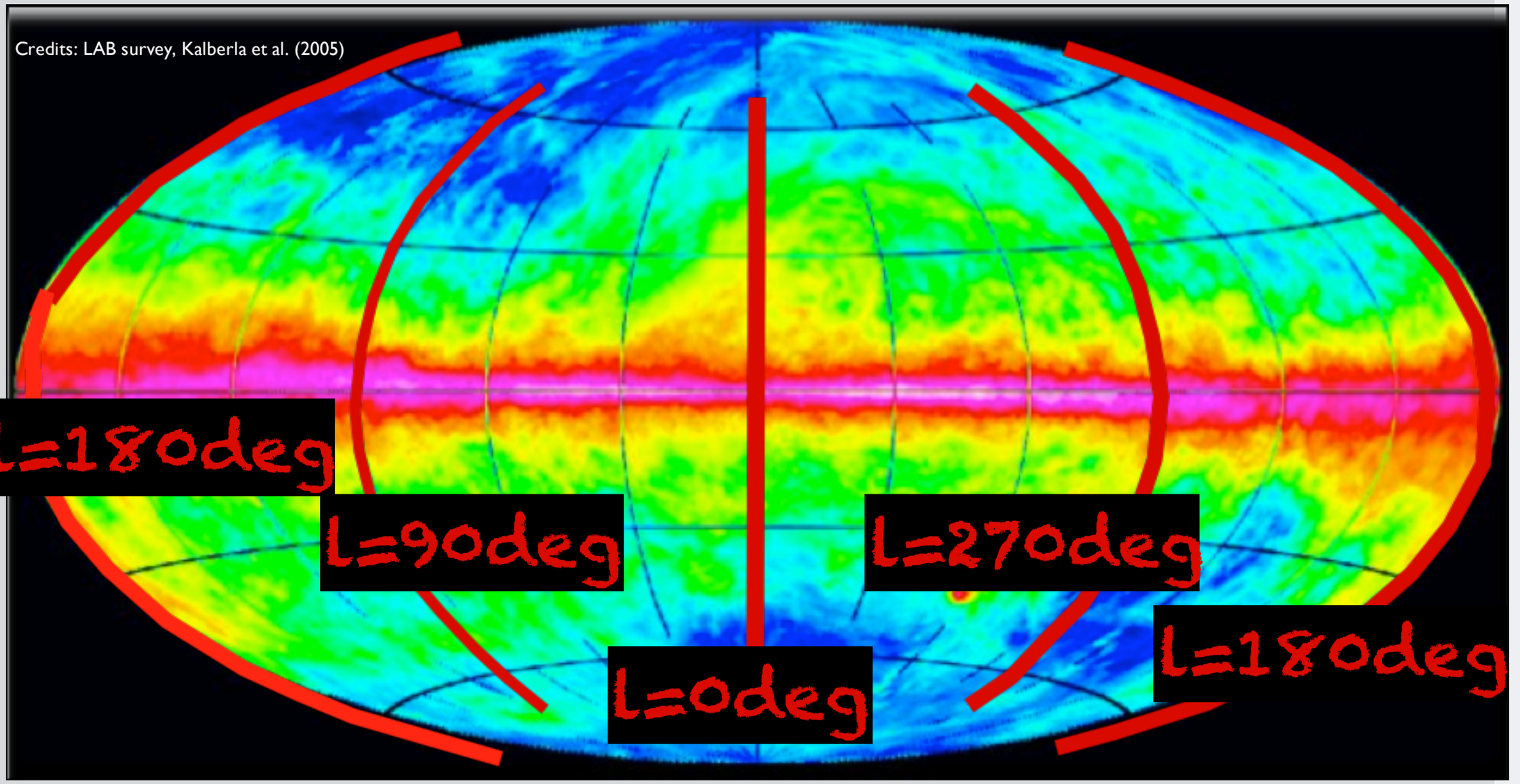
90°< l < 180°

l=180deg

Quadrant III

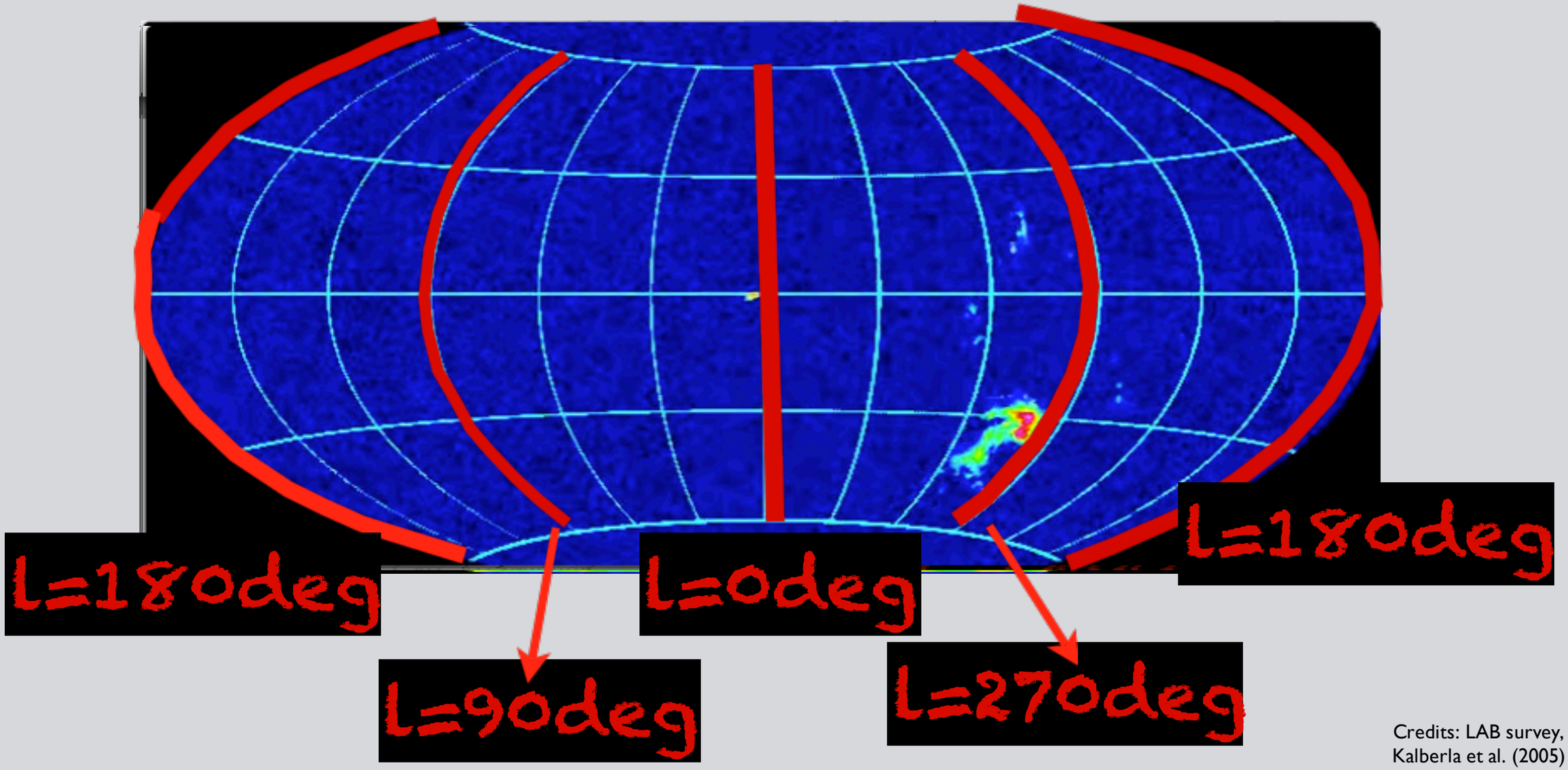
180°< l < 270°

The Milky Way observed in HI and the quadrants



The Milky Way is rotating

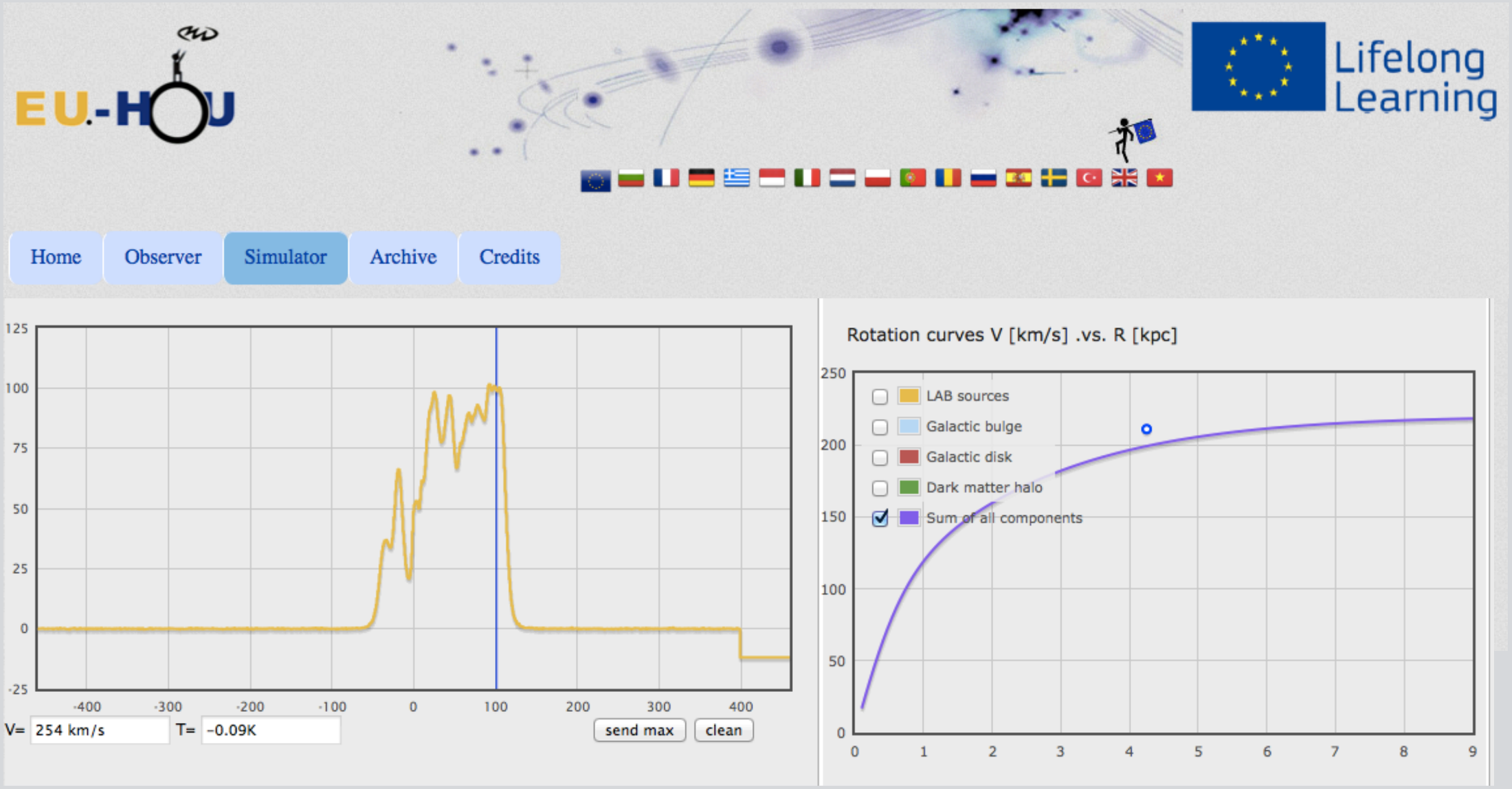
Each image corresponds to a different velocity



Credits: LAB survey,
Kalberla et al. (2005)

ICT tools

ICT tools


EU.-HOU
Lifelong Learning
Home
Observer
Simulator
Archive
Credits
125
100
75
50
25
0
-25
-400
-300
-200
-100
0
100
200
300
400
V= 254 km/s
T= -0.09K
send max
clean
Rotation curves V [km/s] .vs. R [kpc]
250
200
150
100
50
0
1
2
3
4
5
6
7
8
9
LAB sources
Galactic bulge
Galactic disk
Dark matter halo
Sum of all components

EU.-HOU

Lifelong Learning

Home | Observer | Simulator | Archive | Credits

Welcome

Important: you need to have an account to access the antennas

1) Create an account
2) Make a reservation to book a telescope time slot
3) Observe during your allocated time

Note:

1) The French 2m Antenna has been dammaged (being repaired)
2) The Antenna in Romania has been dammaged (being repaired)
3) The Portuguese Antenna is almost available (last tests)

Pedagogical Material

November 24, 2011 | EU-HOU radio astronomy

Welcome to Hands-On Universe, Europe. The aim of this site is to give remote access to small radio telescopes installed throughout Europe. It is possible to operate these telescopes remotly. Based on your observations, you will be able to build a map of our galaxy, the Milky Way...

Observer

Web interface to remotely use the Antenna. A login and password are required to access this facility.

Connect

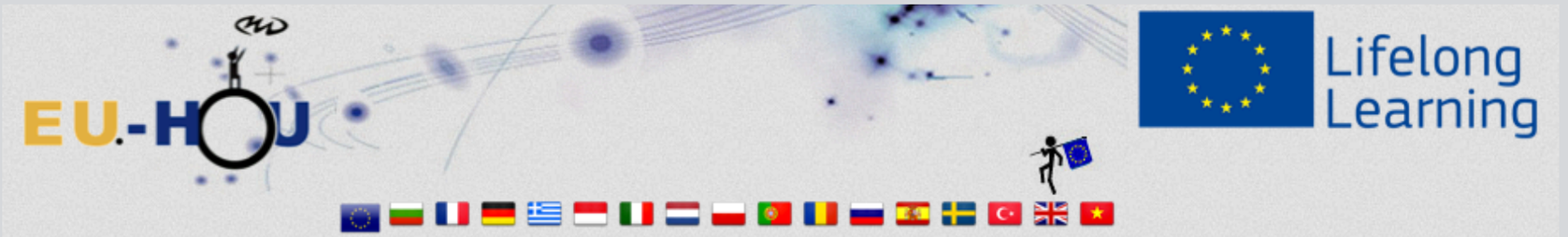
Username

Password

Password forgotten

Log in

Create your account



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Create an account to make a reservation and observe

Username
Password
Password confirmation
First name
Last name
Email
Country
Language
Status
Motivation

Create your account

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