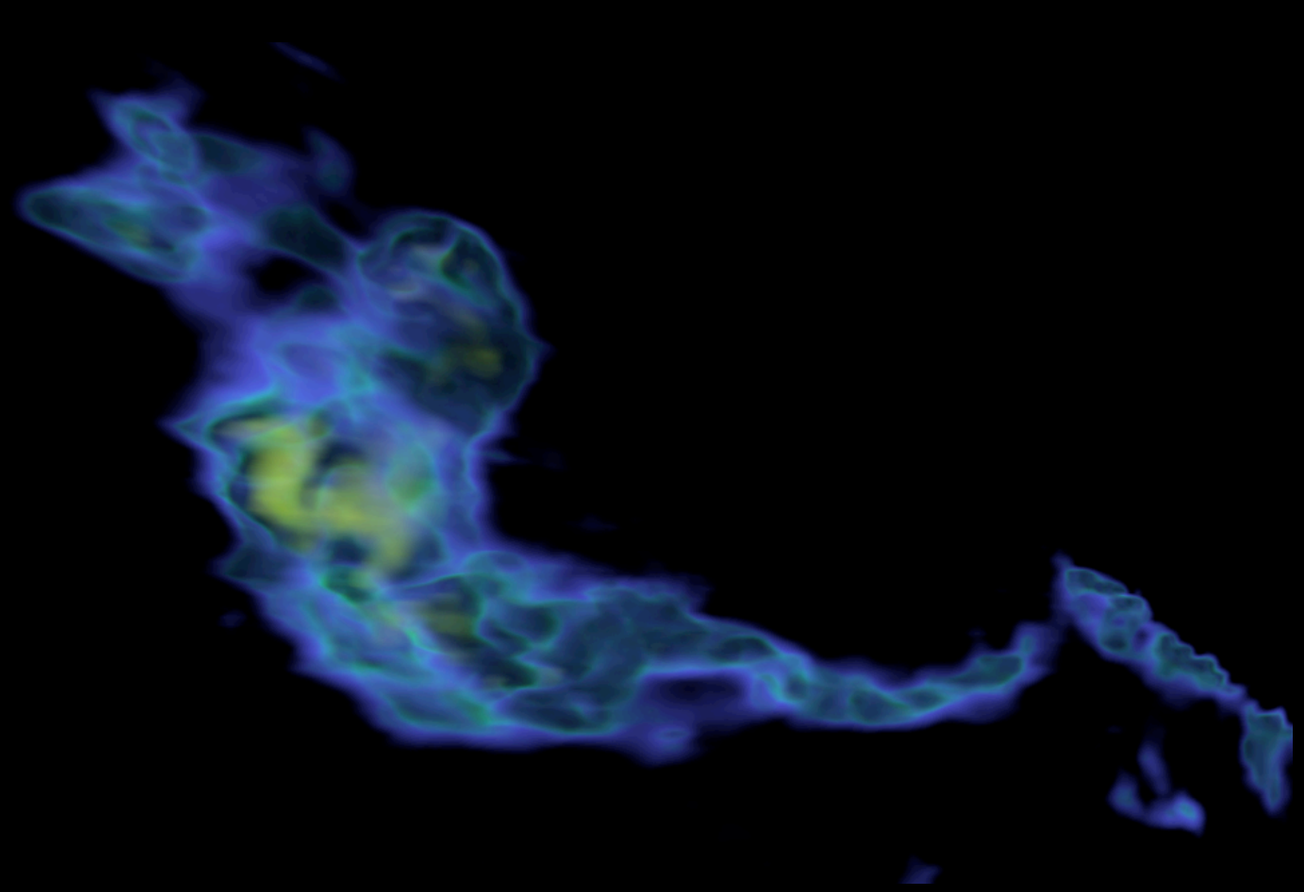
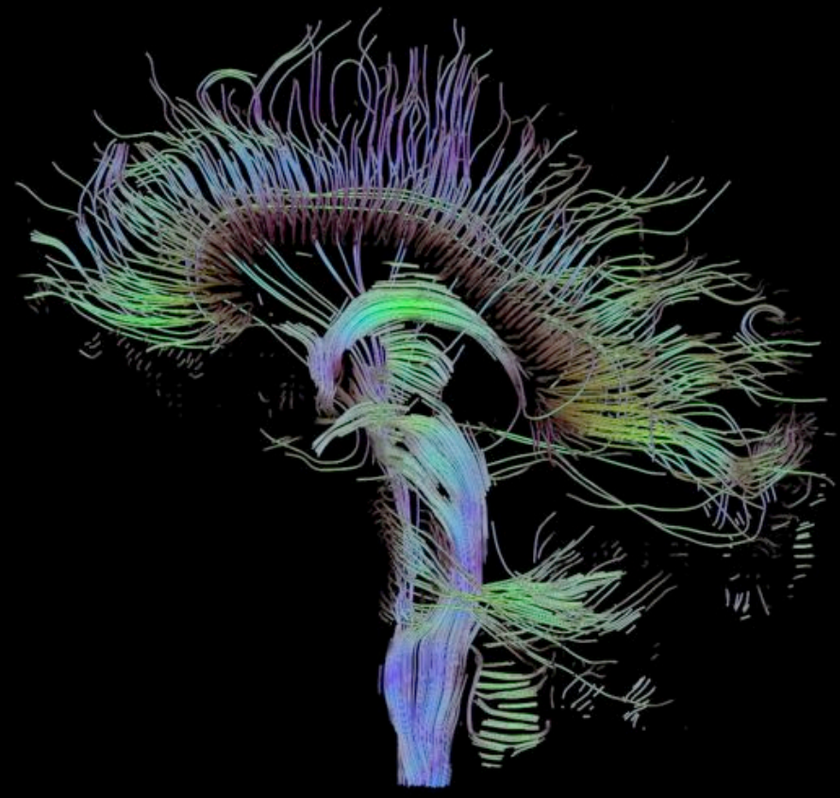
Data Intensive Science in Astronomy & Medicine





Alyssa A. Goodman
Initiative in Innovative Computing @ Harvard
and
Harvard-Smithsonian Center for Astrophysics

Shared Challenges...Shared Approaches?

Astronomy

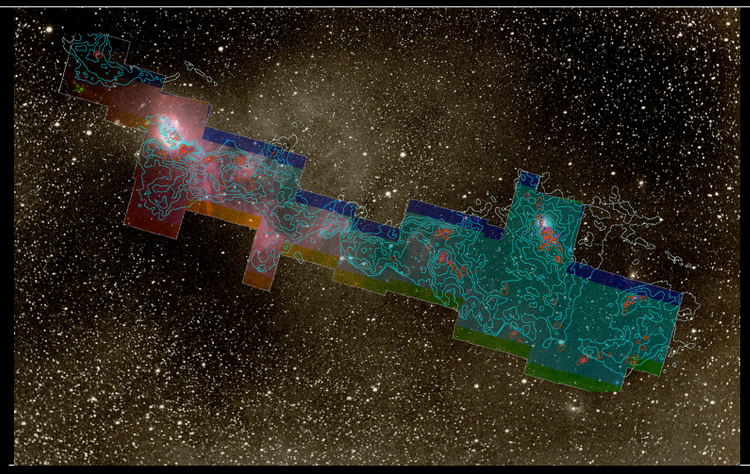
Medicine

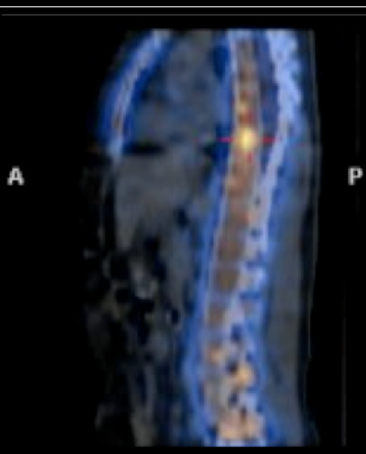
Shared Challenges...Shared Approaches?

Astronomy

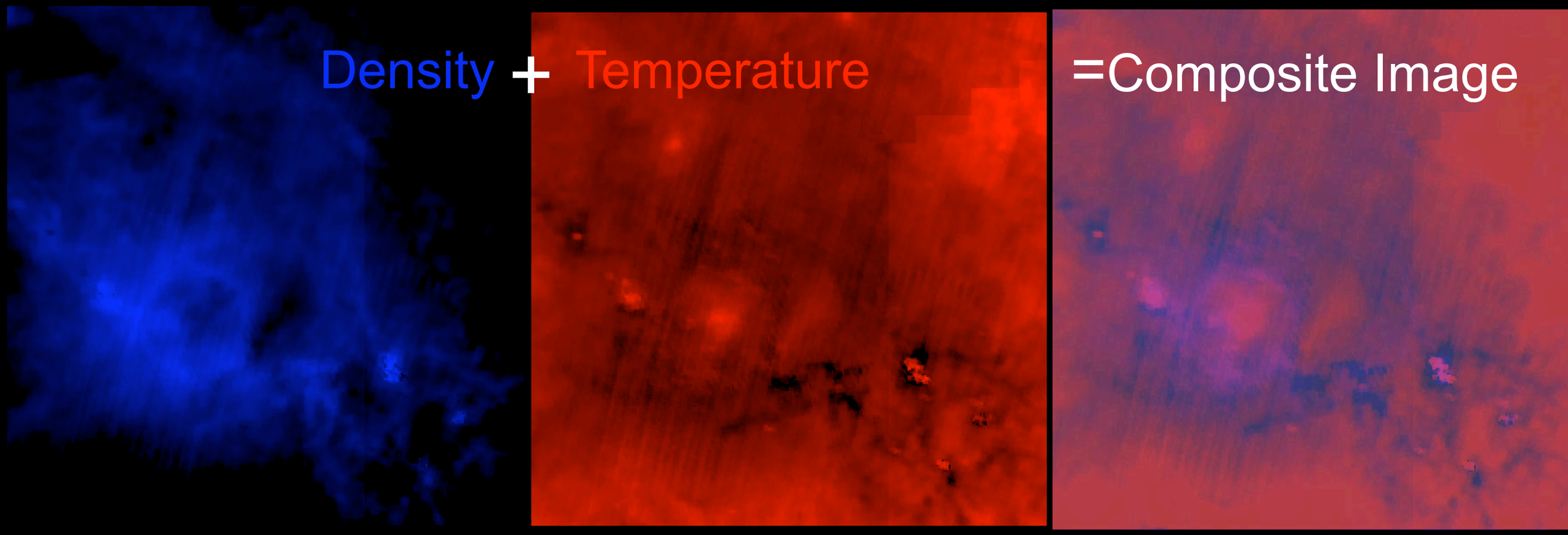
Medicine

Heavily Reliant on “Multi-Modal Imaging”



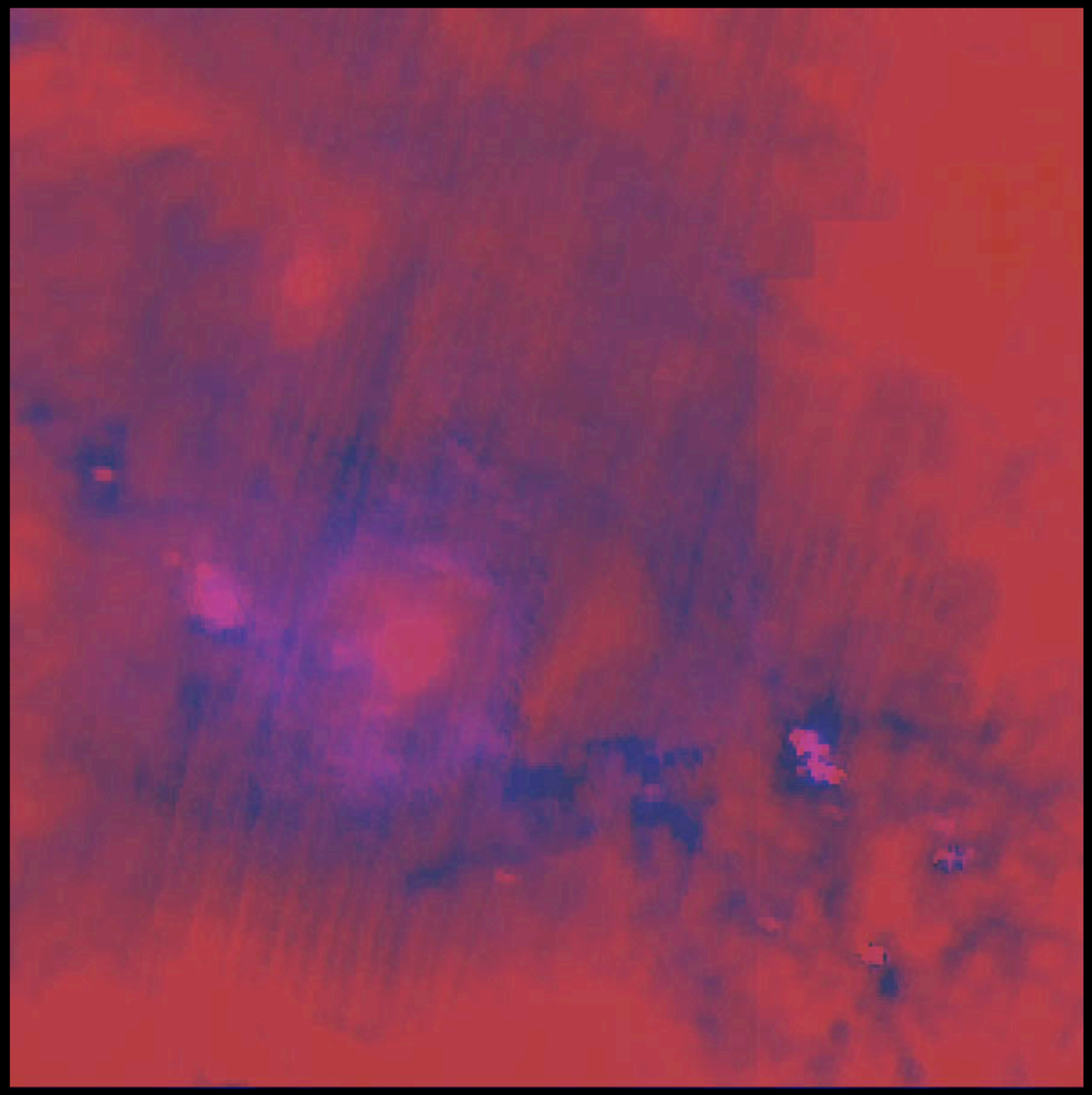


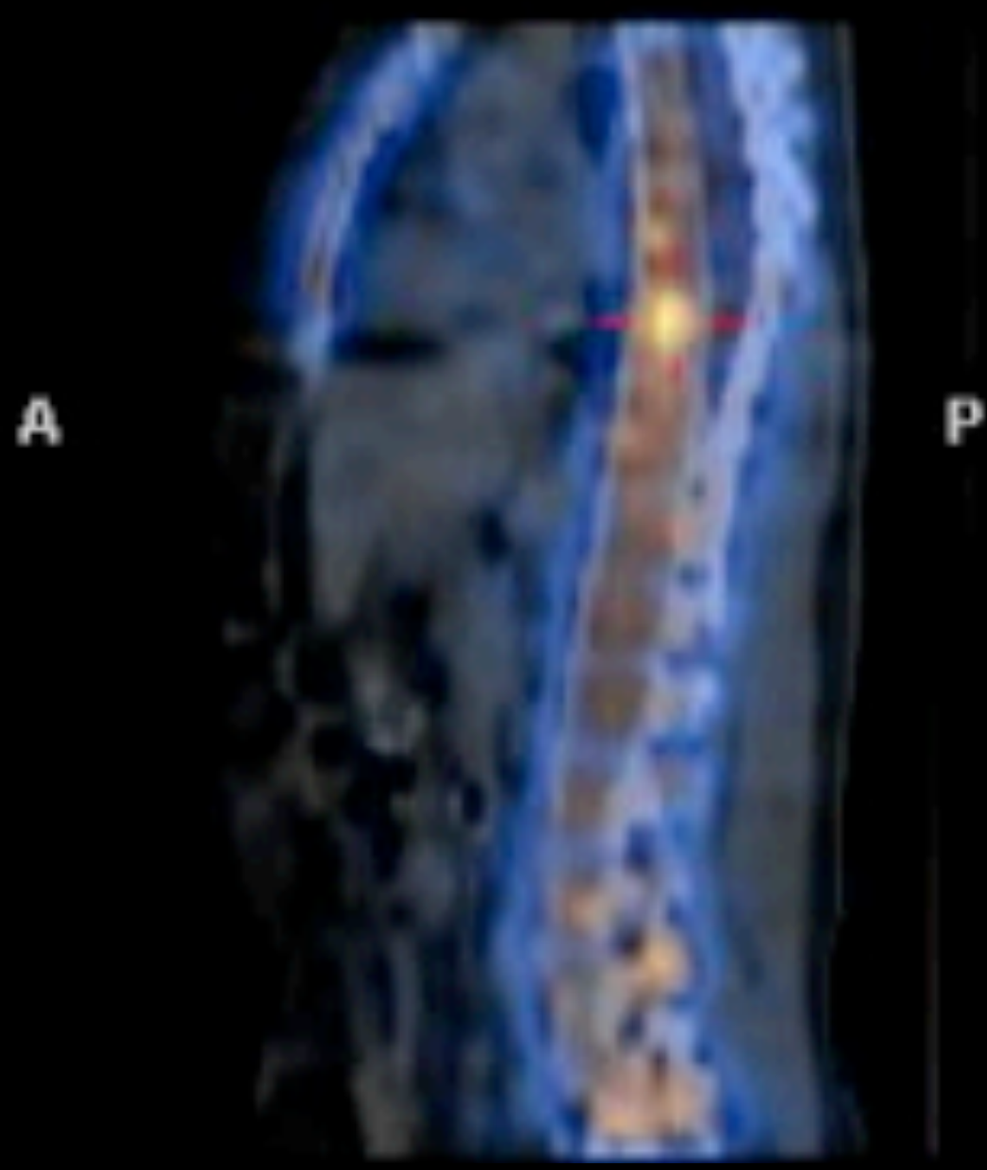
“Multimodal Imaging”



Dust mapping of Perseus based on IRAS data included in the COMPLETE Survey of Star-Forming Regions (Schnee et al. 2005; Ridge et al. 2006)

Astro-Medical Multimodal Imaging



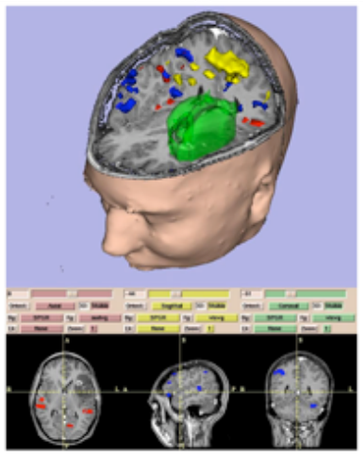


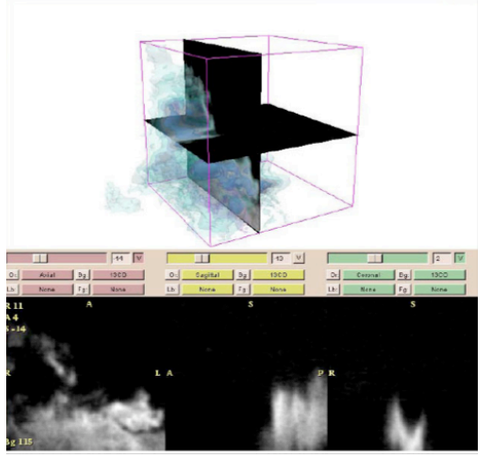
Shared Challenges...Shared Approaches?

Astronomy

Medicine

Increasingly reliant on 3D and 4D imaging





COMPLETE=COordinated Molecular Probe Line Extinction Thermal Emission

mm peak (Enoch et al. 2006)

sub-mm peak (Hatchell et al. 2005, Kirk et al. 2006)

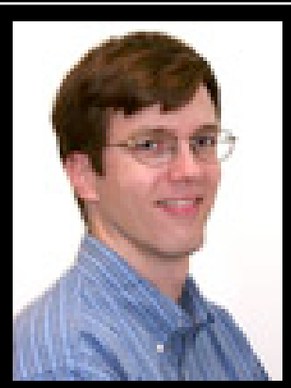
^{13}CO (Ridge et al. 2006)

mid-IR IRAC composite from c2d data (Foster, Laakso, Ridge, et al. in prep.)

Optical image (Barnard 1927)

The Astronomical Medicine Story

Computer Scientist

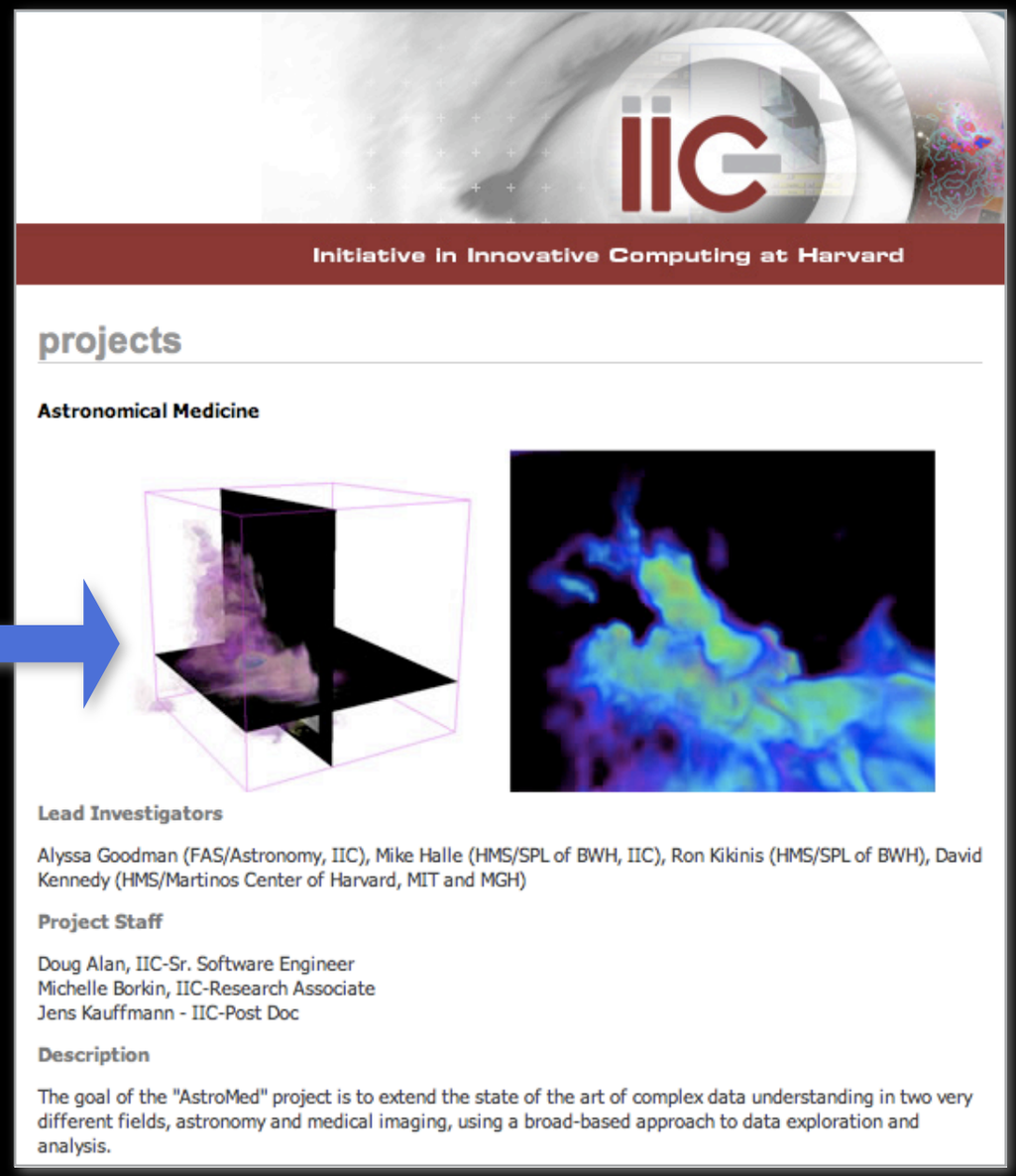


Computer Scientist

"Viz has failed the scientific community…"

Astronomer

Unsuspecting Undergrad

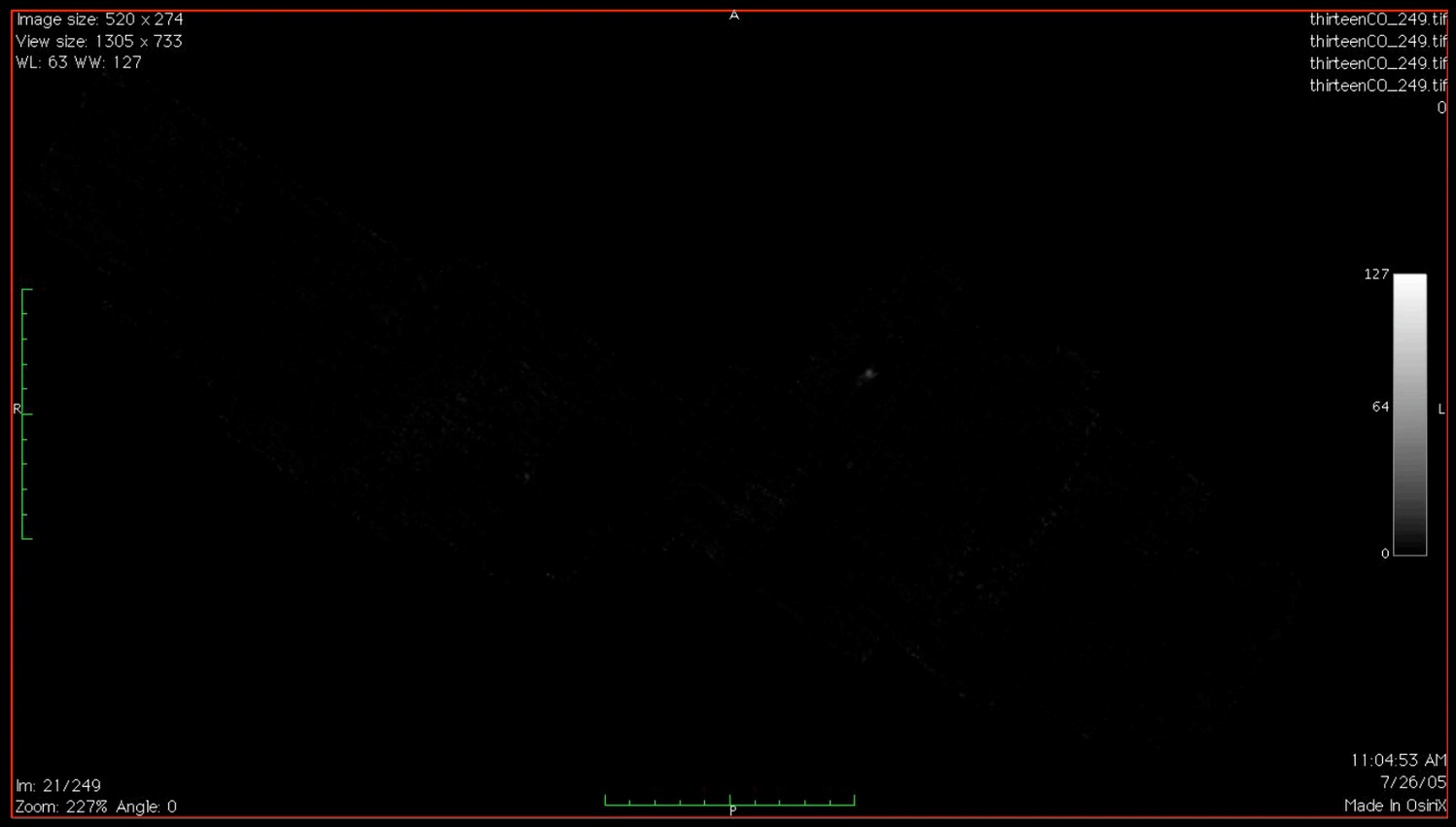


+Nick Holliman (CS, 3D expert)
+Doug Alan (S/W Engineer)
+Jens Kauffmann (postdoc)

“Slices”

“KEITH”

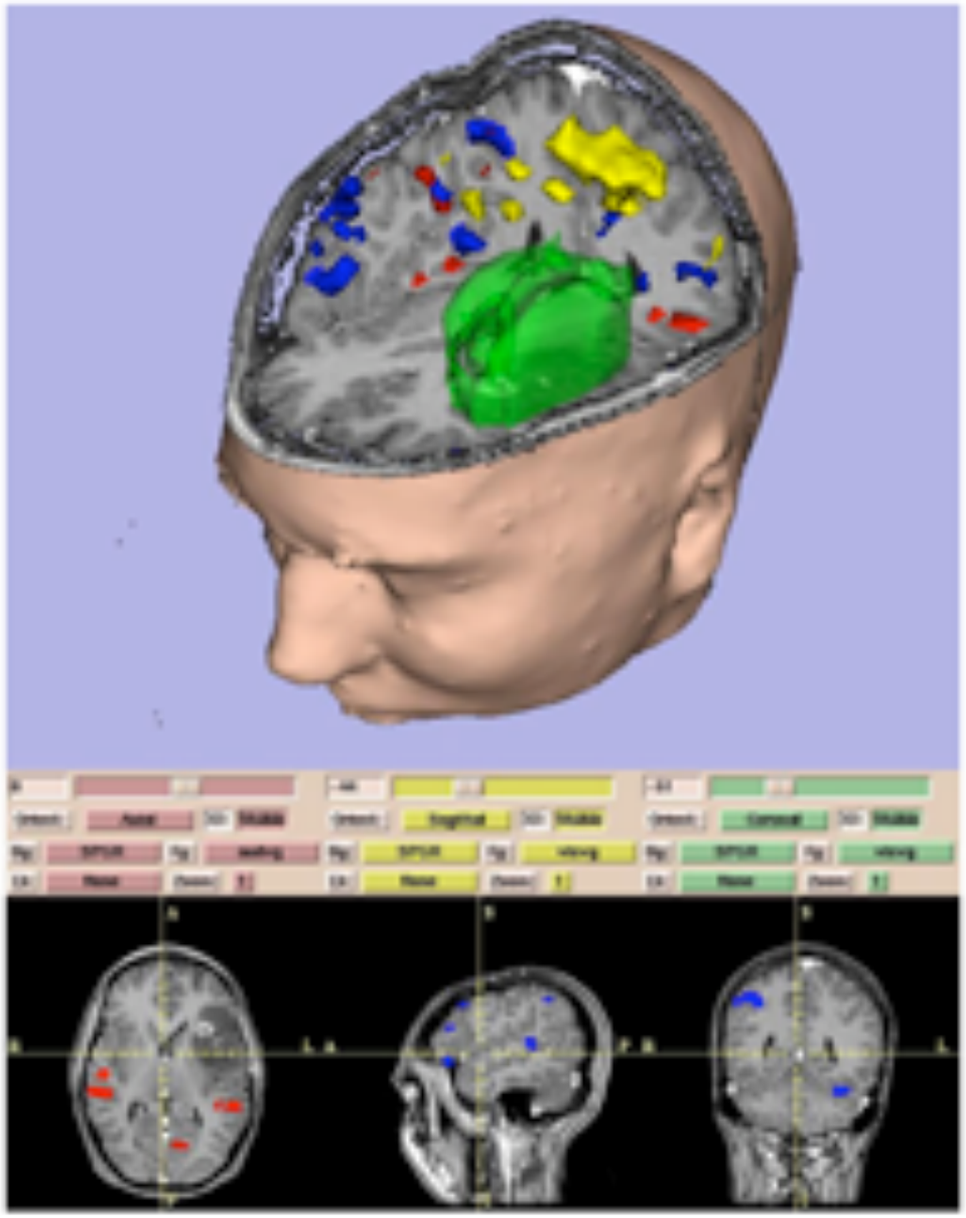
“PERSEUS”



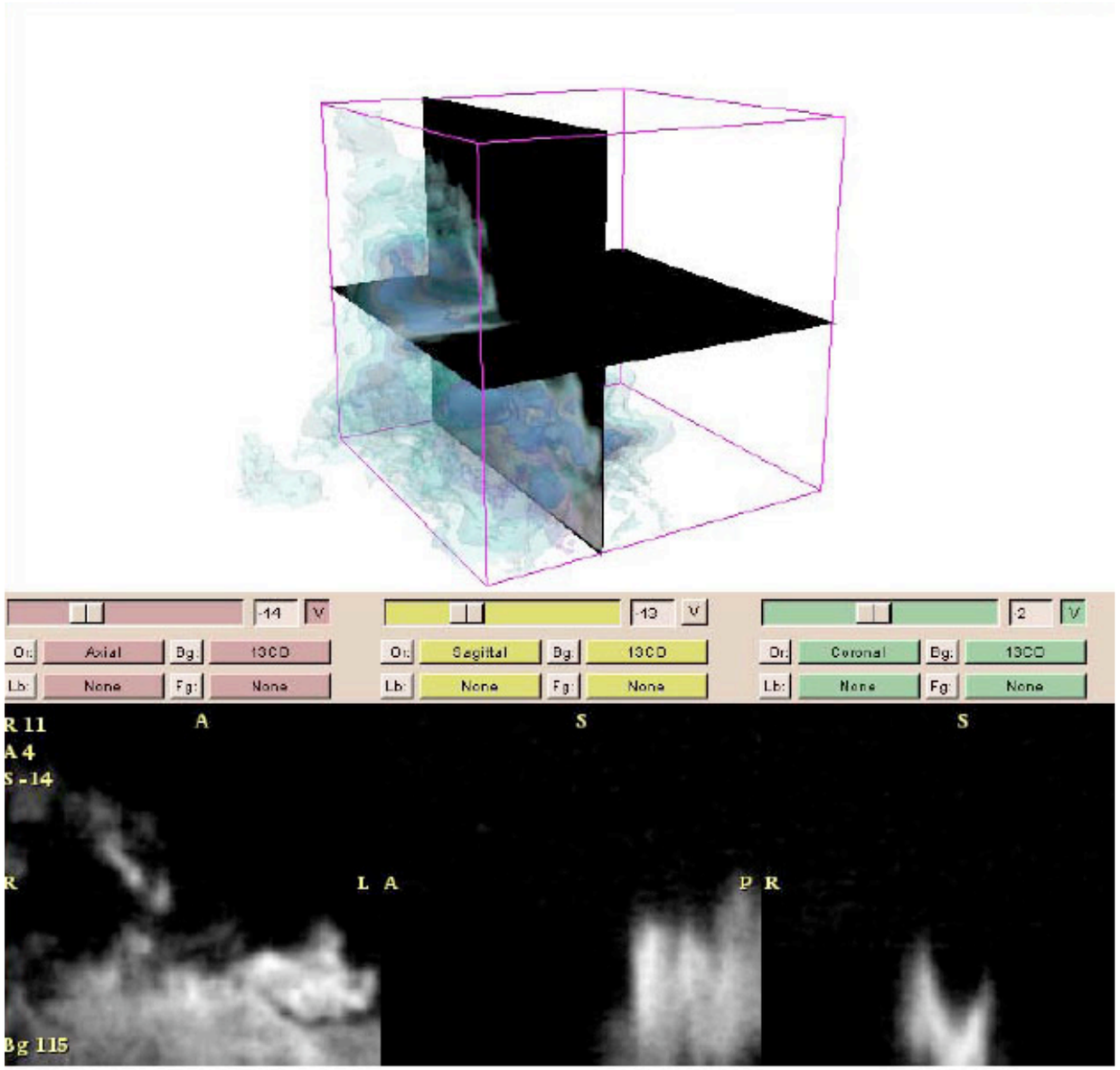
“z” is depth into head

“z” is line-of-sight velocity

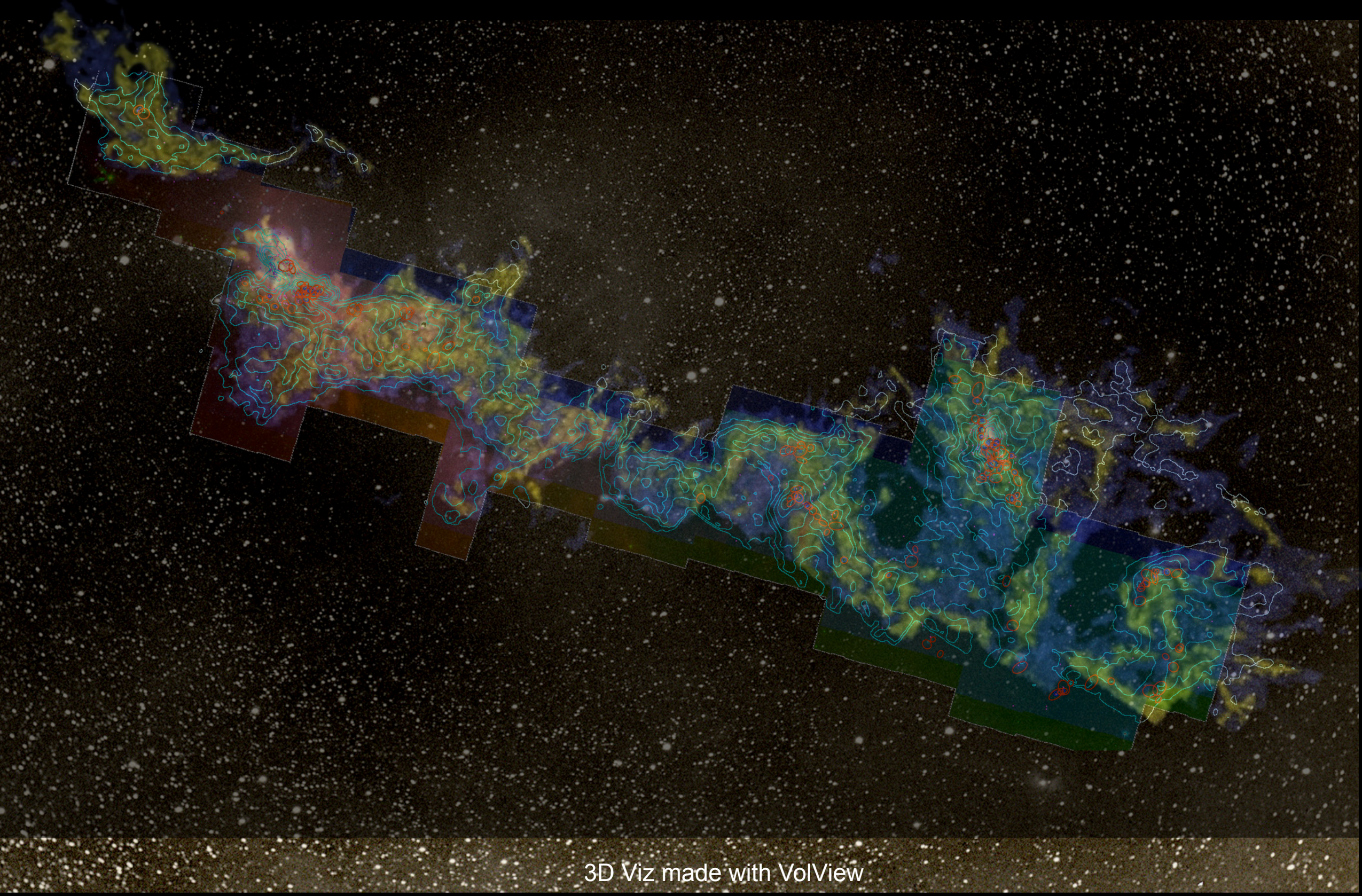
"Astronomical Medicine"



MRI



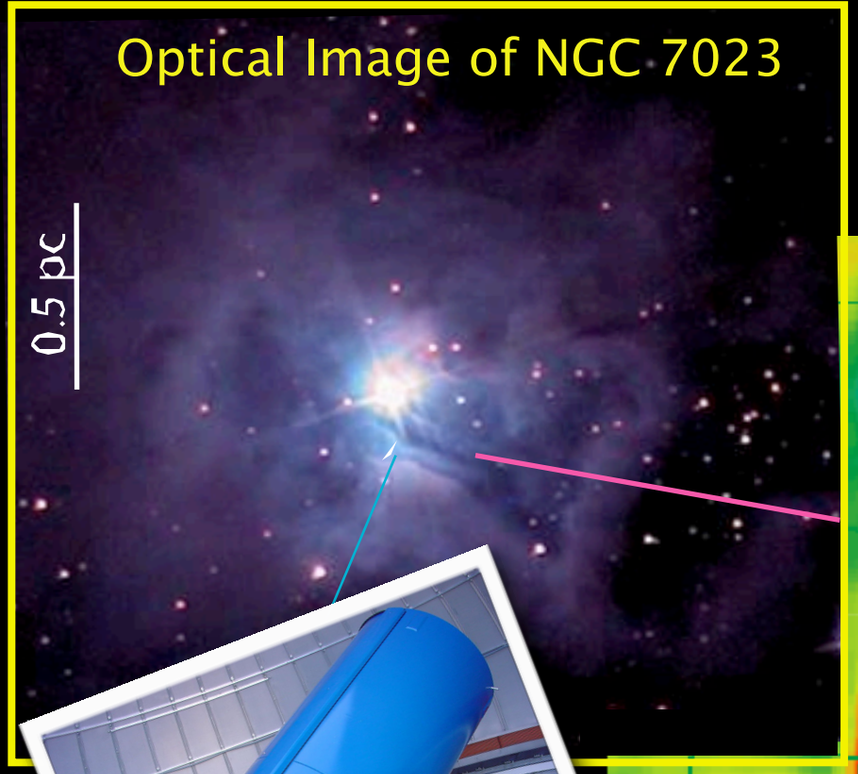
Spectral-Line Data Cubes

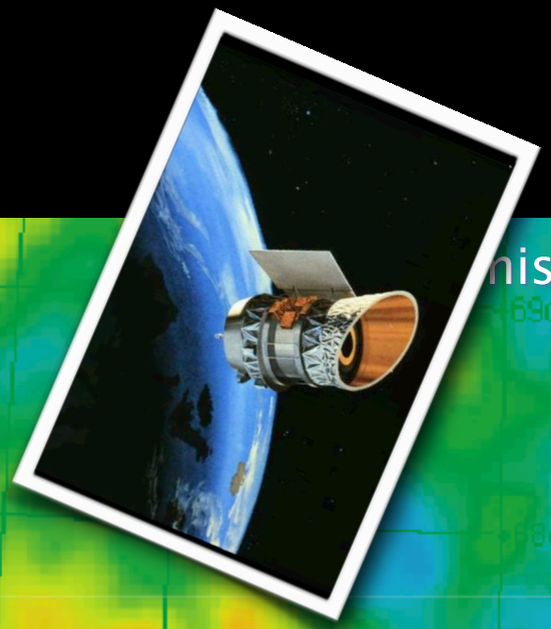


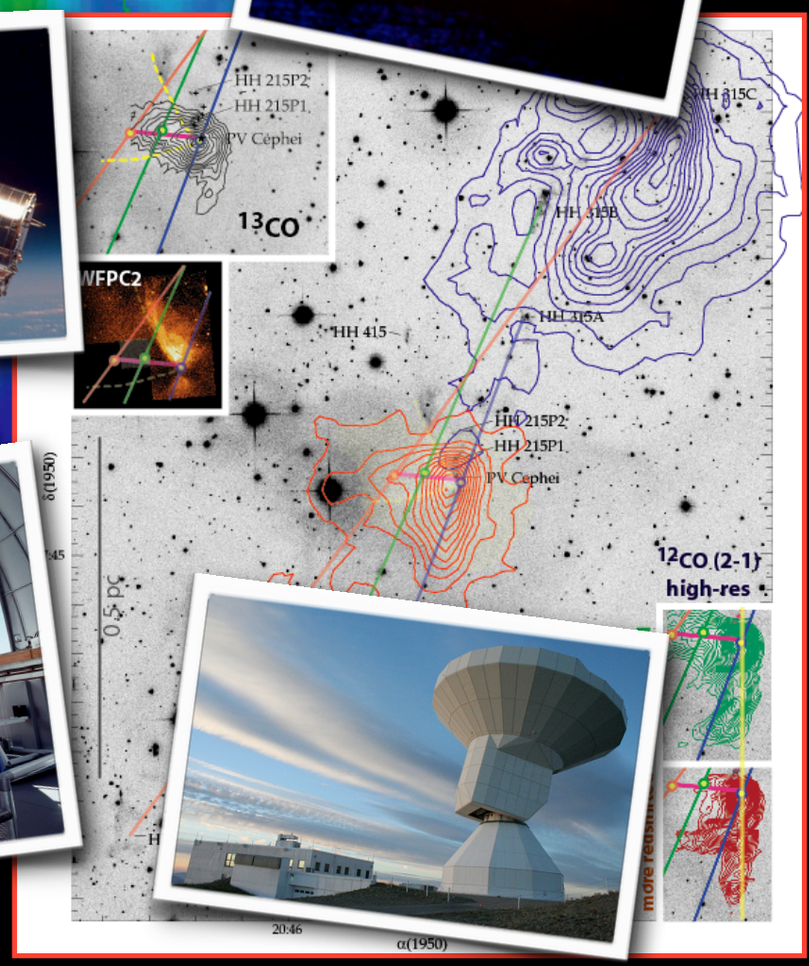
AstronomicalMedicine@ IIG COMPLETE

Shared Challenges...Shared Approaches?

	 Astronomy	 Medicine
Distributed Users, with needs to combine diverse, distributed, data sets	"The Virtual Observatory"	"The BIRN" (Biomedical Informatics Research Network)



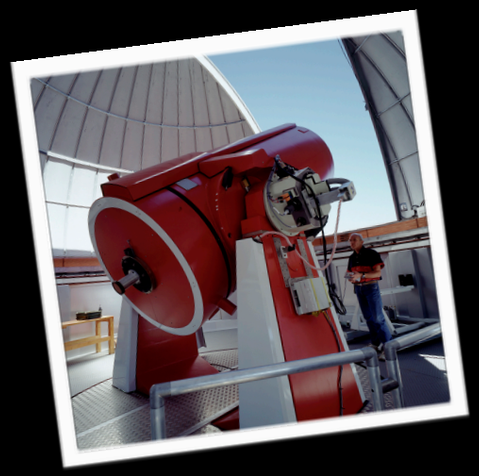




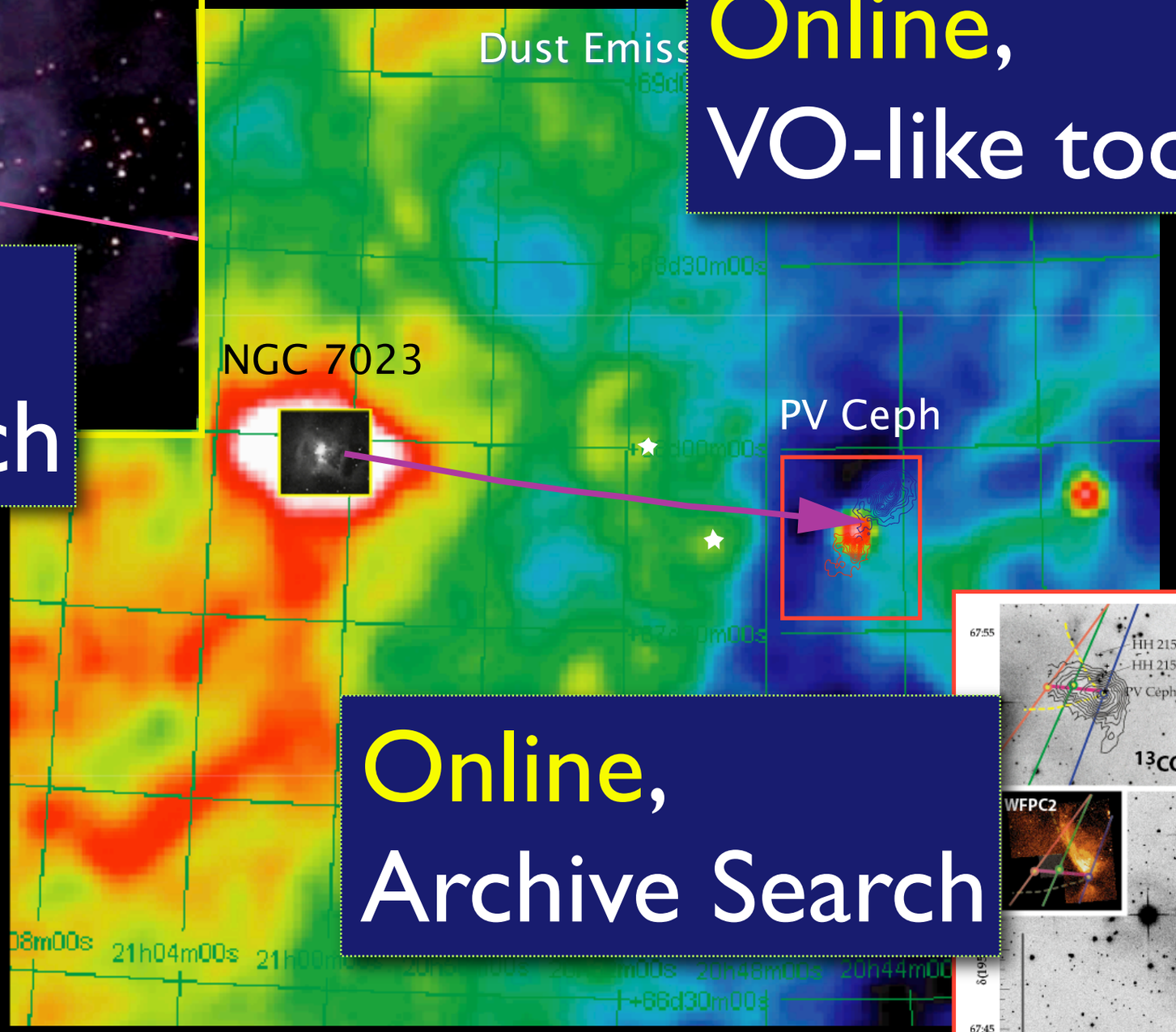
Star Running Away from Home!

Goodman & Arce 2004

Six *Different* Telescopes...
and how did we get the data??



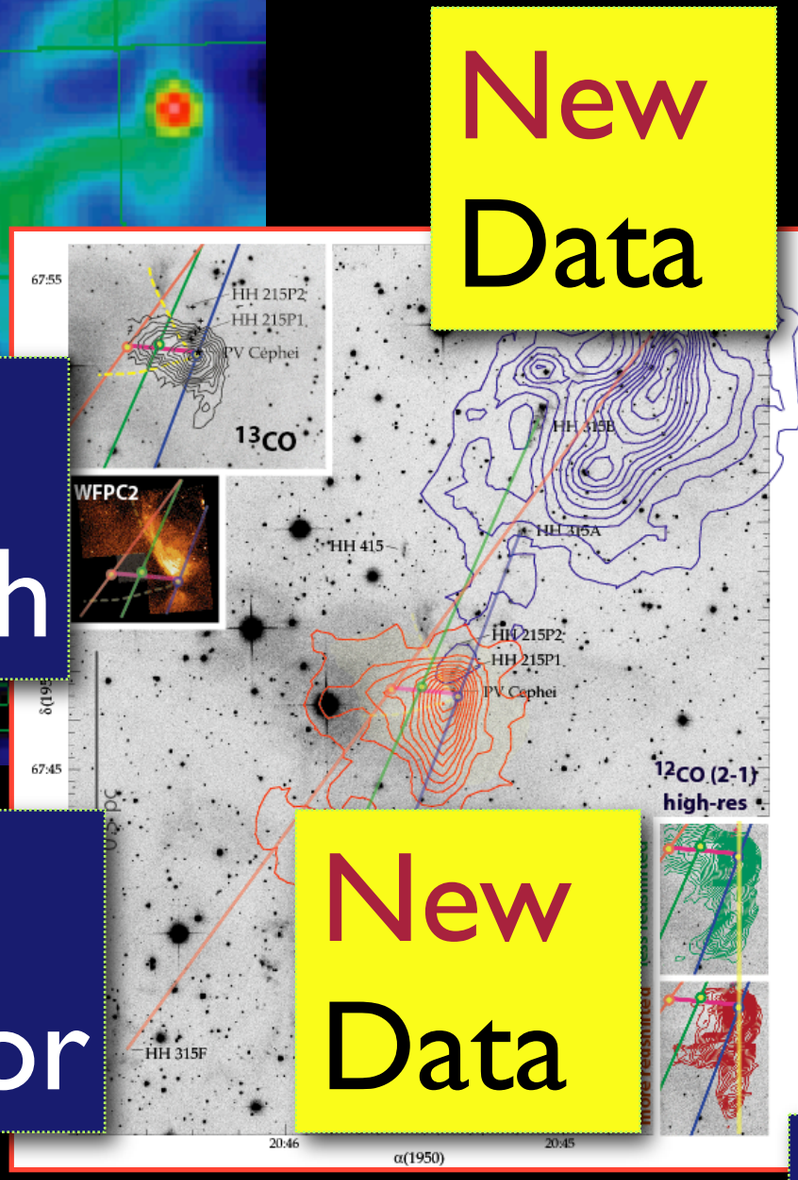
Online,
Web Search



Online,
VO-like tool

Online,
Archive Search

Email
from Author



New
Data

New
Data

Goodman & Arce 2004

What do I want?

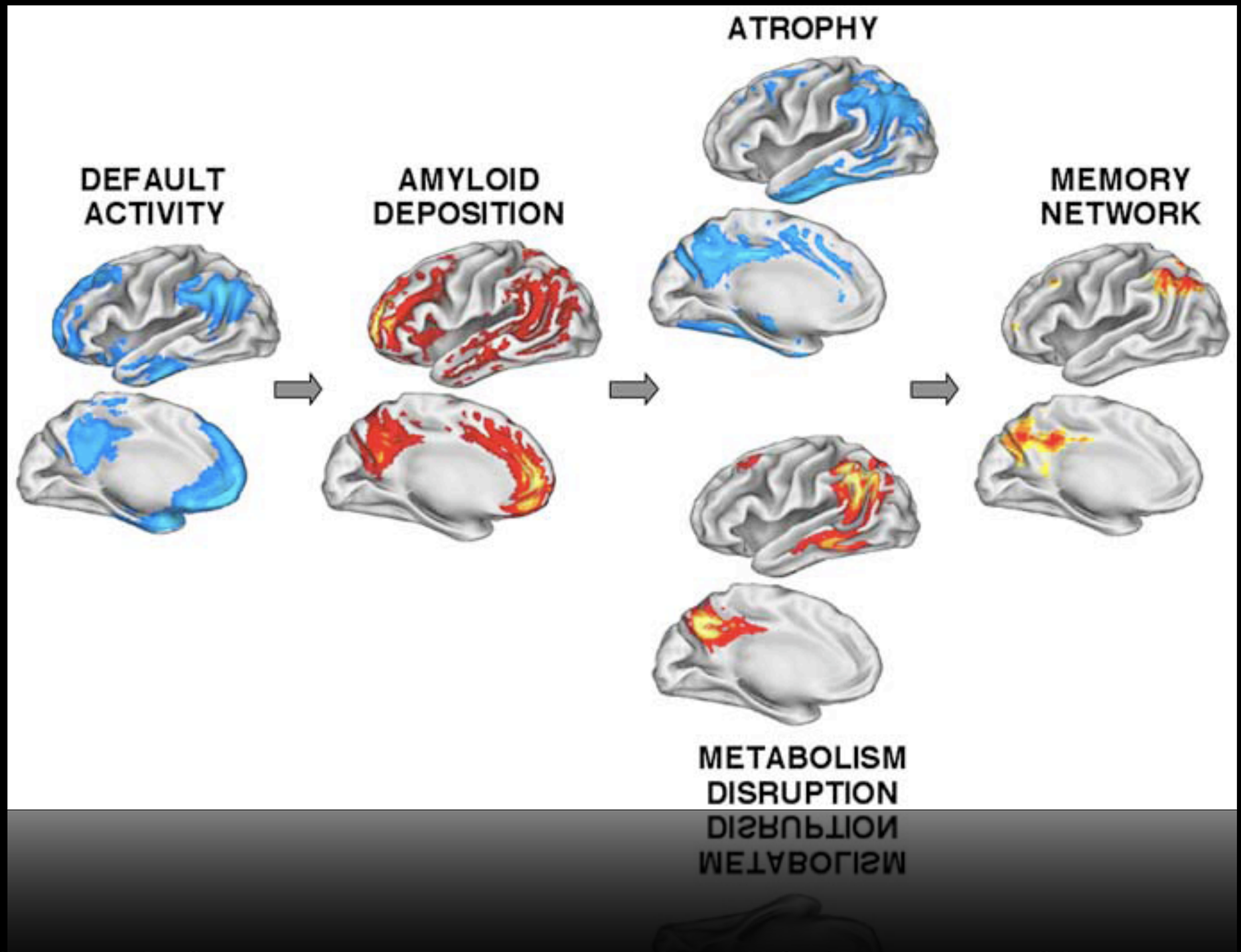
Seamless tools that let me make discoveries like this, for:

any object, or set of objects, in the sky

...in seconds

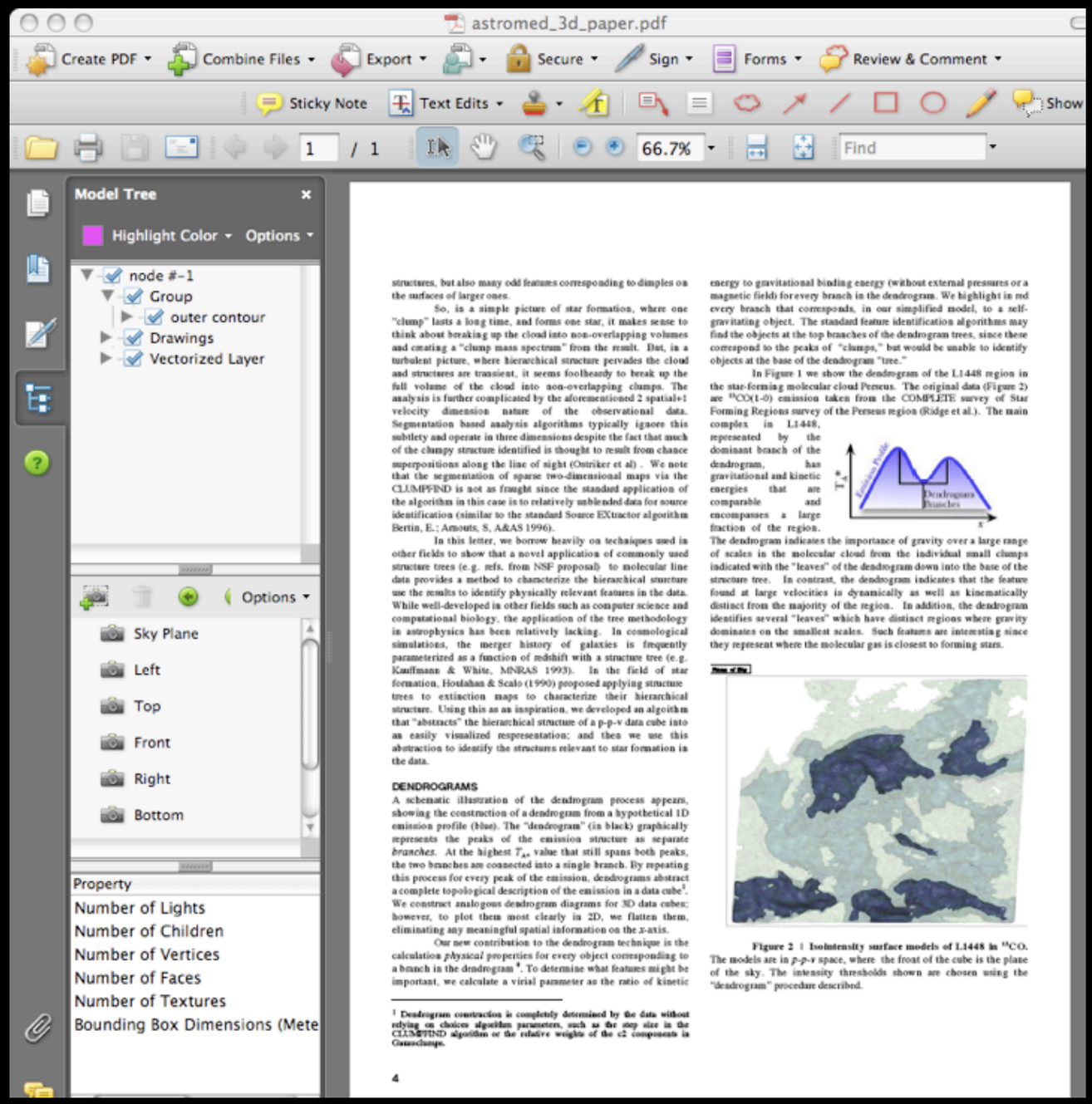
...and then I would like to share what I've done with others, through publications and *much* more.

...and my friends want that too...



e.g. ***"Neuroinformatics Framework"*** *at IIC (Buckner, Clark, Fariello, Hyman, Rosen, et al.); image from Buckner et al. 2005,*

Publishing & Sharing



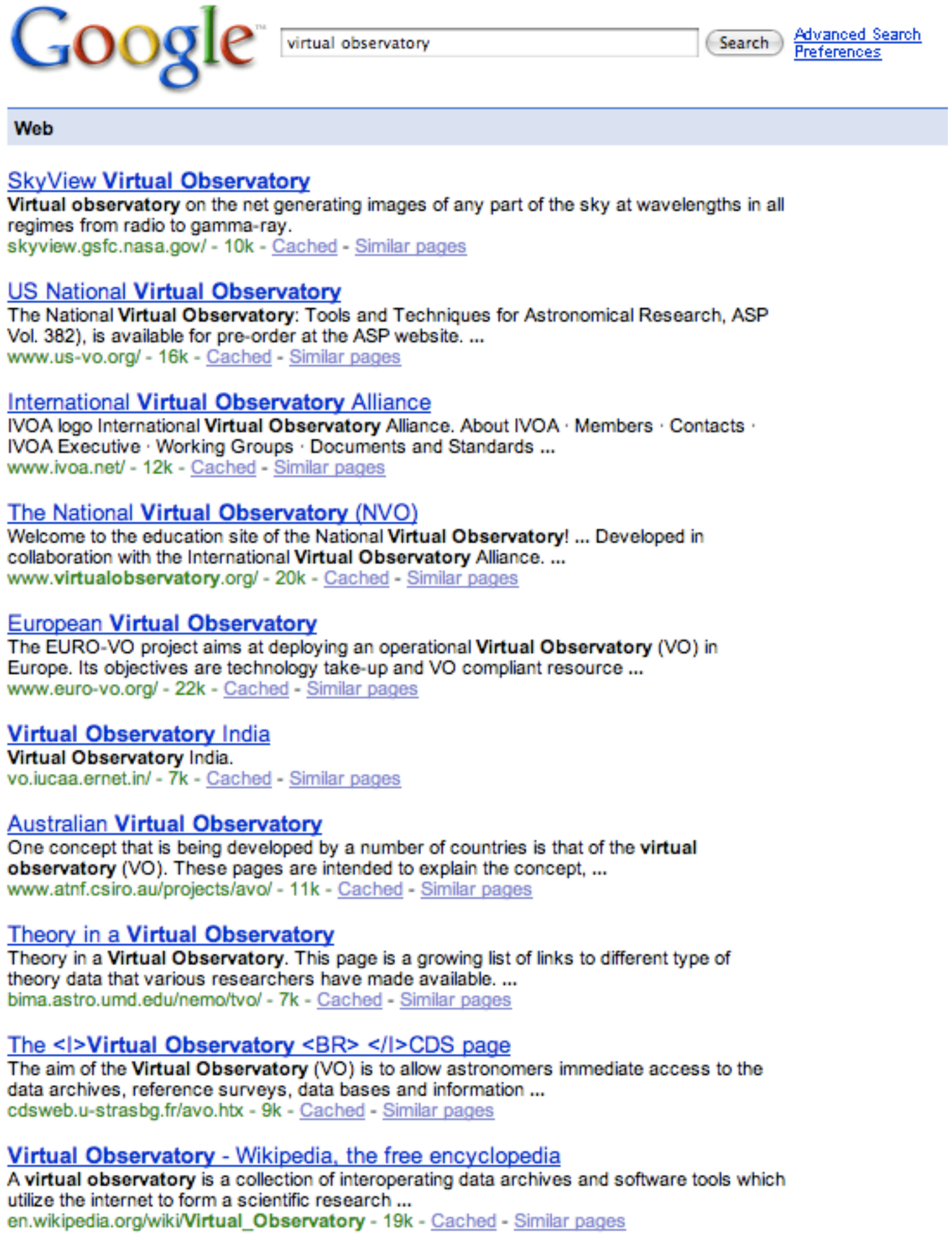
Goodman et al., *Nature*, submitted June 2007;
see also Barnes & Fluke 2007 arXiv:0709.2734

Shared Challenges...Shared Approaches?

	 Astronomy	 Medicine
Distributed Users, with needs to combine diverse, distributed, data sets	"The Virtual Observatory"	"The BIRN" (Biomedical Informatics Research Network)

What is "the" Virtual Observatory?

(see Alex Szalay's talk in this Symposium)



Google virtual observatory Search Advanced Search Preferences

Web

SkyView **Virtual Observatory**
Virtual observatory on the net generating images of any part of the sky at wavelengths in all regimes from radio to gamma-ray.
skyview.gsfc.nasa.gov/ - 10k - Cached - Similar pages

US National **Virtual Observatory**
The National **Virtual Observatory**: Tools and Techniques for Astronomical Research, ASP Vol. 382), is available for pre-order at the ASP website. ...
www.us-vo.org/ - 16k - Cached - Similar pages

International **Virtual Observatory** Alliance
IVOA logo International **Virtual Observatory** Alliance. About IVOA · Members · Contacts · IVOA Executive · Working Groups · Documents and Standards ...
www.ivoa.net/ - 12k - Cached - Similar pages

The National **Virtual Observatory** (NVO)
Welcome to the education site of the National **Virtual Observatory**! ... Developed in collaboration with the International **Virtual Observatory** Alliance. ...
www.**virtualobservatory**.org/ - 20k - Cached - Similar pages

European **Virtual Observatory**
The EURO-VO project aims at deploying an operational **Virtual Observatory** (VO) in Europe. Its objectives are technology take-up and VO compliant resource ...
www.euro-vo.org/ - 22k - Cached - Similar pages

Virtual Observatory India
Virtual Observatory India.
vo.iucaa.ernet.in/ - 7k - Cached - Similar pages

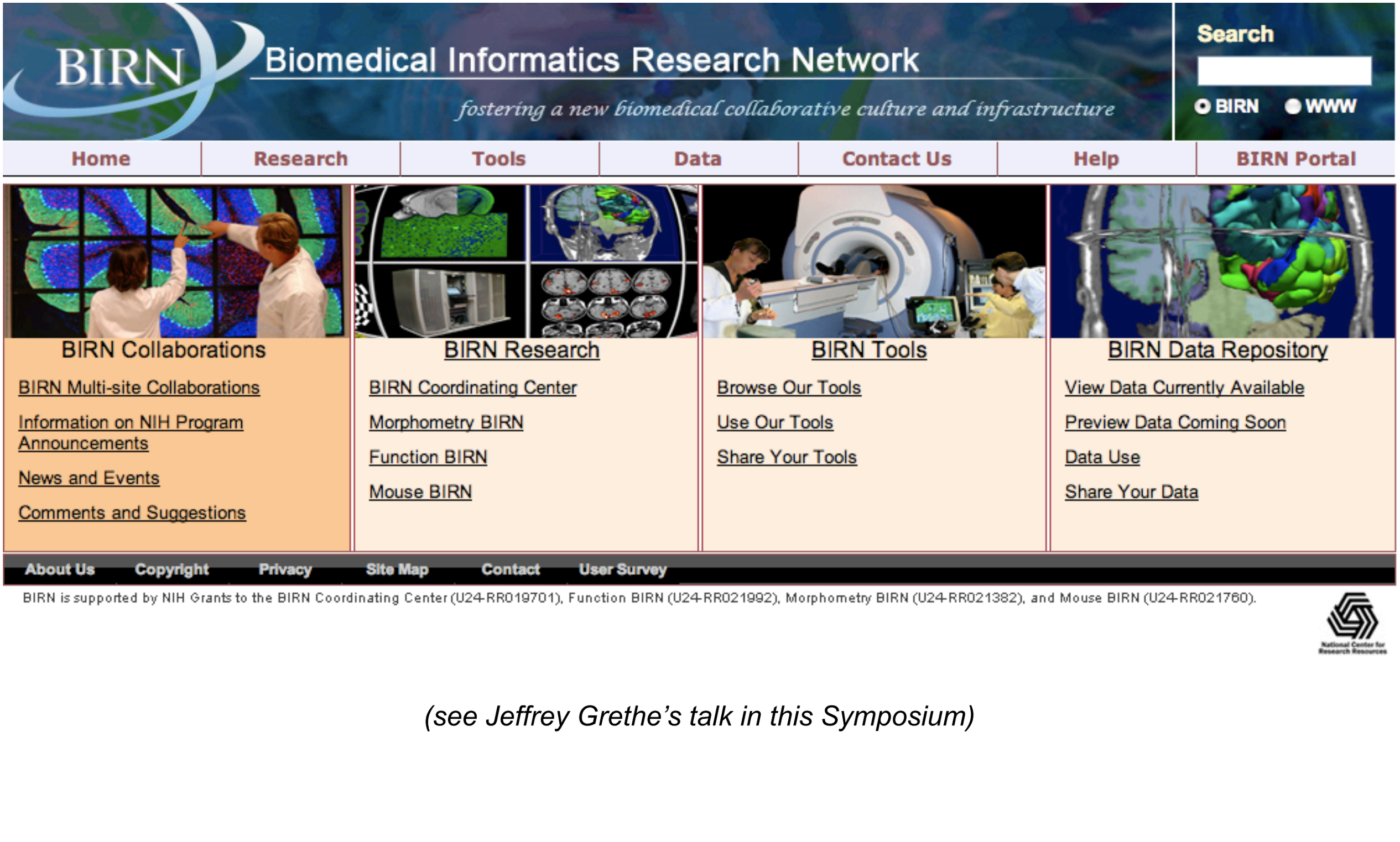
Australian **Virtual Observatory**
One concept that is being developed by a number of countries is that of the **virtual observatory** (VO). These pages are intended to explain the concept, ...
www.atnf.csiro.au/projects/avo/ - 11k - Cached - Similar pages

Theory in a **Virtual Observatory**
Theory in a **Virtual Observatory**. This page is a growing list of links to different type of theory data that various researchers have made available. ...
bima.astro.umd.edu/nemo/tvo/ - 7k - Cached - Similar pages

The <I>**Virtual Observatory**
 </I>CDS page
The aim of the **Virtual Observatory** (VO) is to allow astronomers immediate access to the data archives, reference surveys, data bases and information ...
cdsweb.u-strasbg.fr/avo.htx - 9k - Cached - Similar pages

Virtual Observatory - Wikipedia, the free encyclopedia
A **virtual observatory** is a collection of interoperating data archives and software tools which utilize the internet to form a scientific research ...
en.wikipedia.org/wiki/**Virtual_Observatory** - 19k - Cached - Similar pages

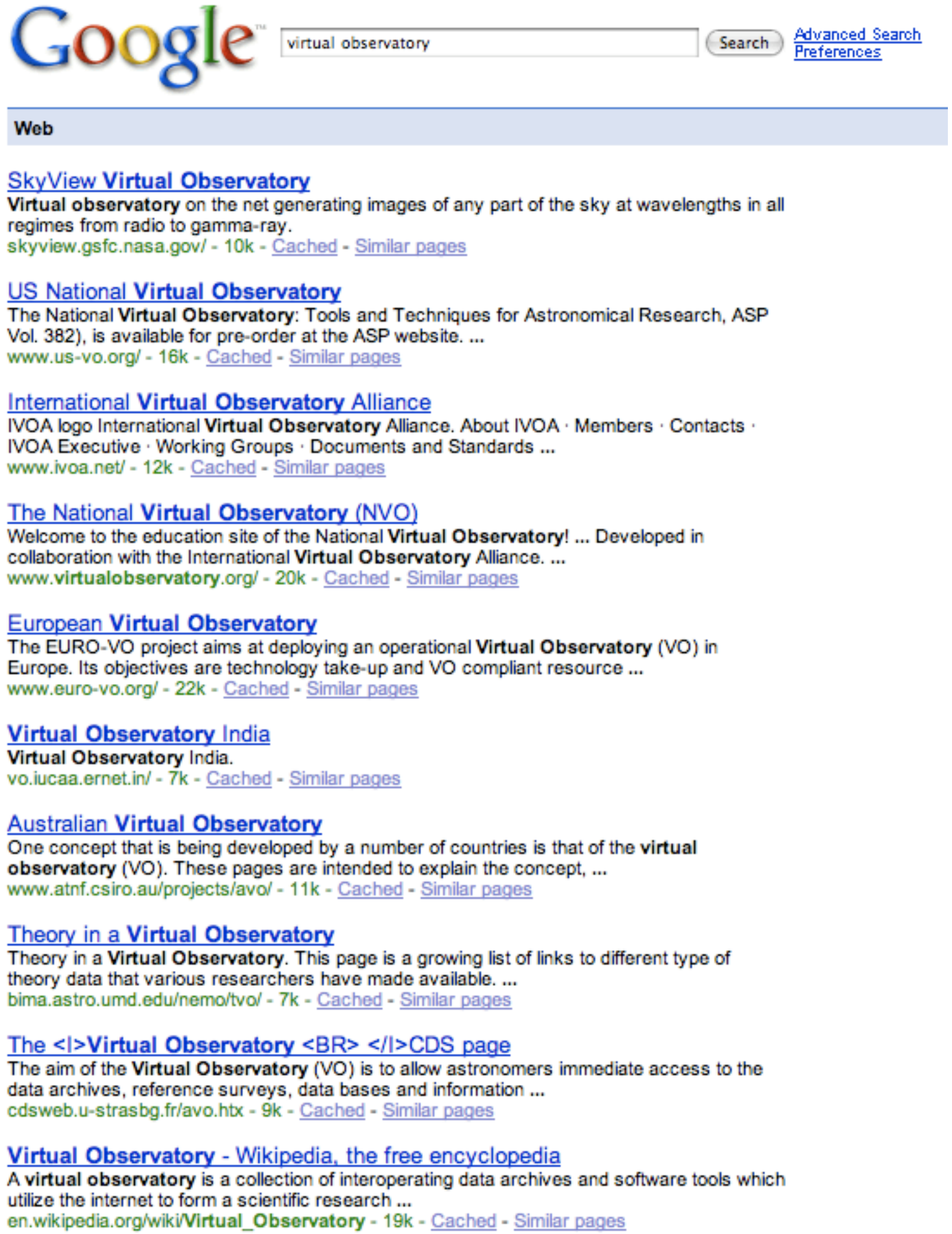
...and "the BIRN"?



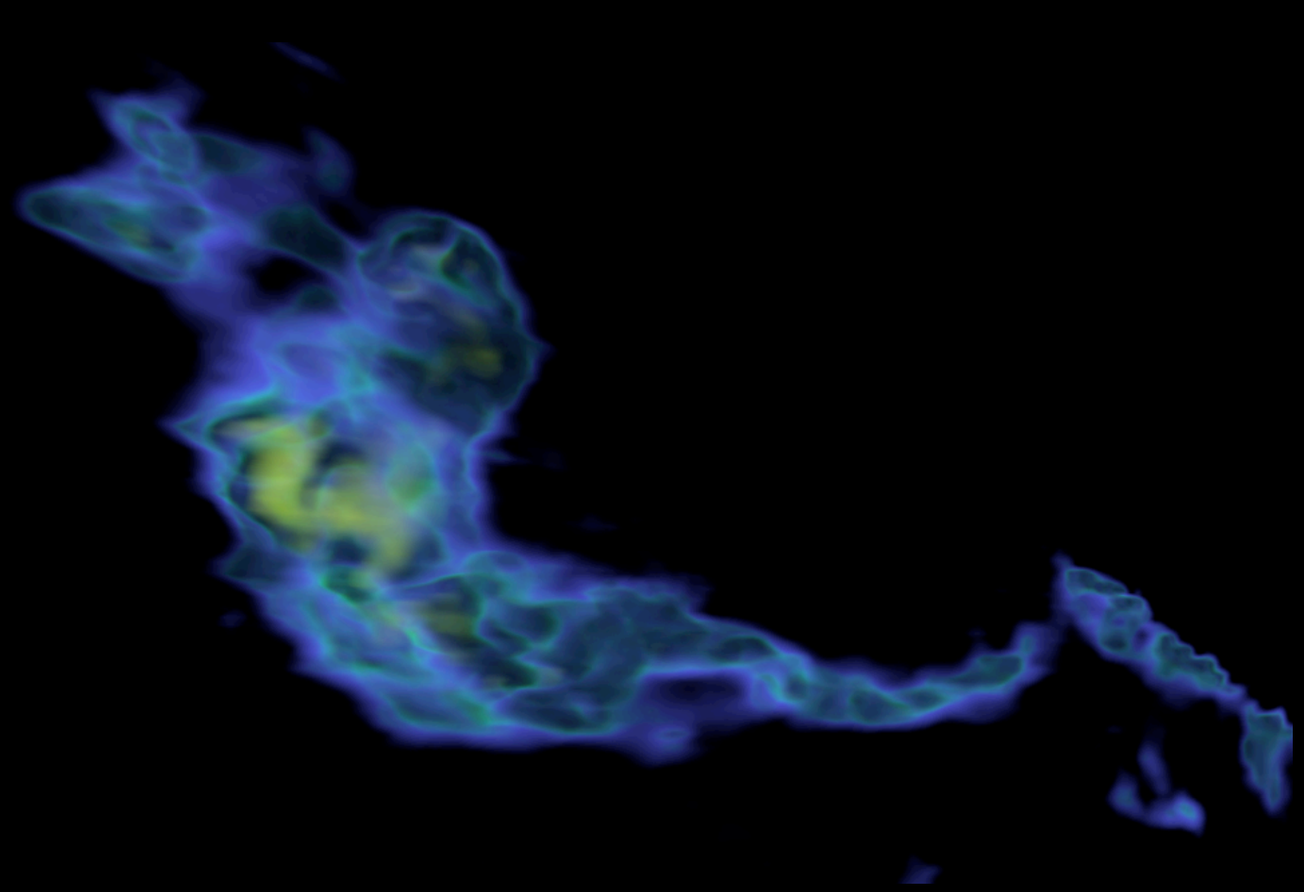
(see Jeffrey Grethe's talk in this Symposium)

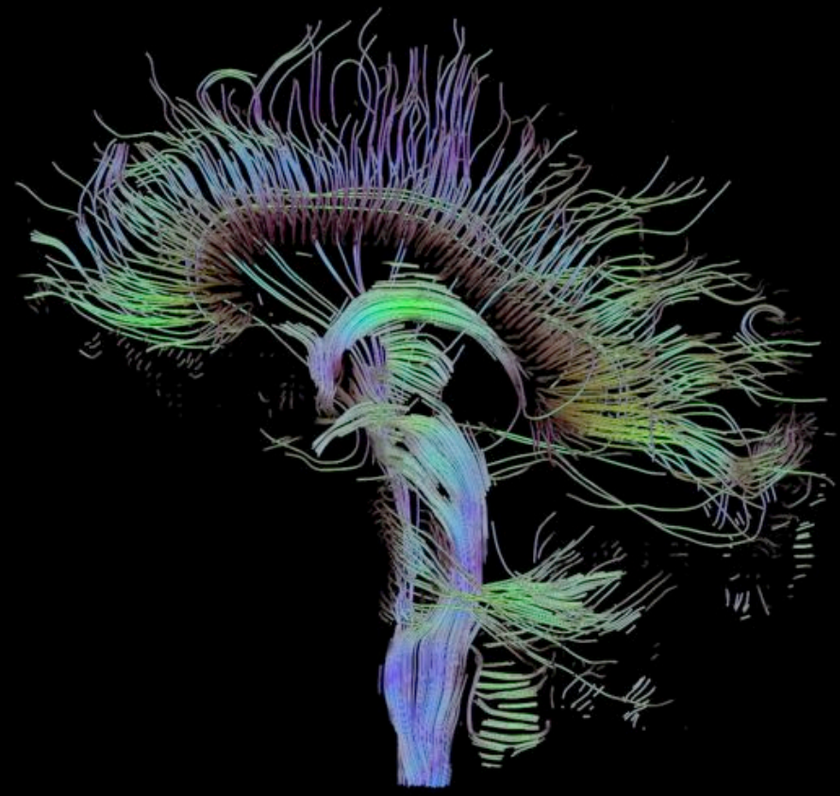
BIRN **Organization**

What is “the” Virtual Observatory?



Data Intensive Science in Astronomy & Medicine





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