

LIGO's Participation and Use of

THE OPEN SCIENCE GRID (OSG)

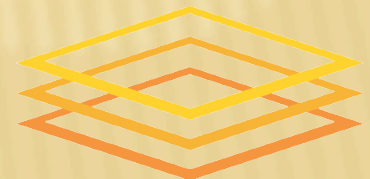
KENT BLACKBURN - OSG COUNCIL CO-CHAIR

LIGO LABORATORY - CALTECH

LIGO VIRGO COLLABORATION MEETING

AMSTERDAM, SEPTEMBER 2008

LIGO-G080459-00-E



OSG PROJECT FUNDING

✘ National Science Foundation

- + *Math and Physical Sciences*
- + *Office of Cyber Infrastructure*
- + *Office of International Science and Engineering*

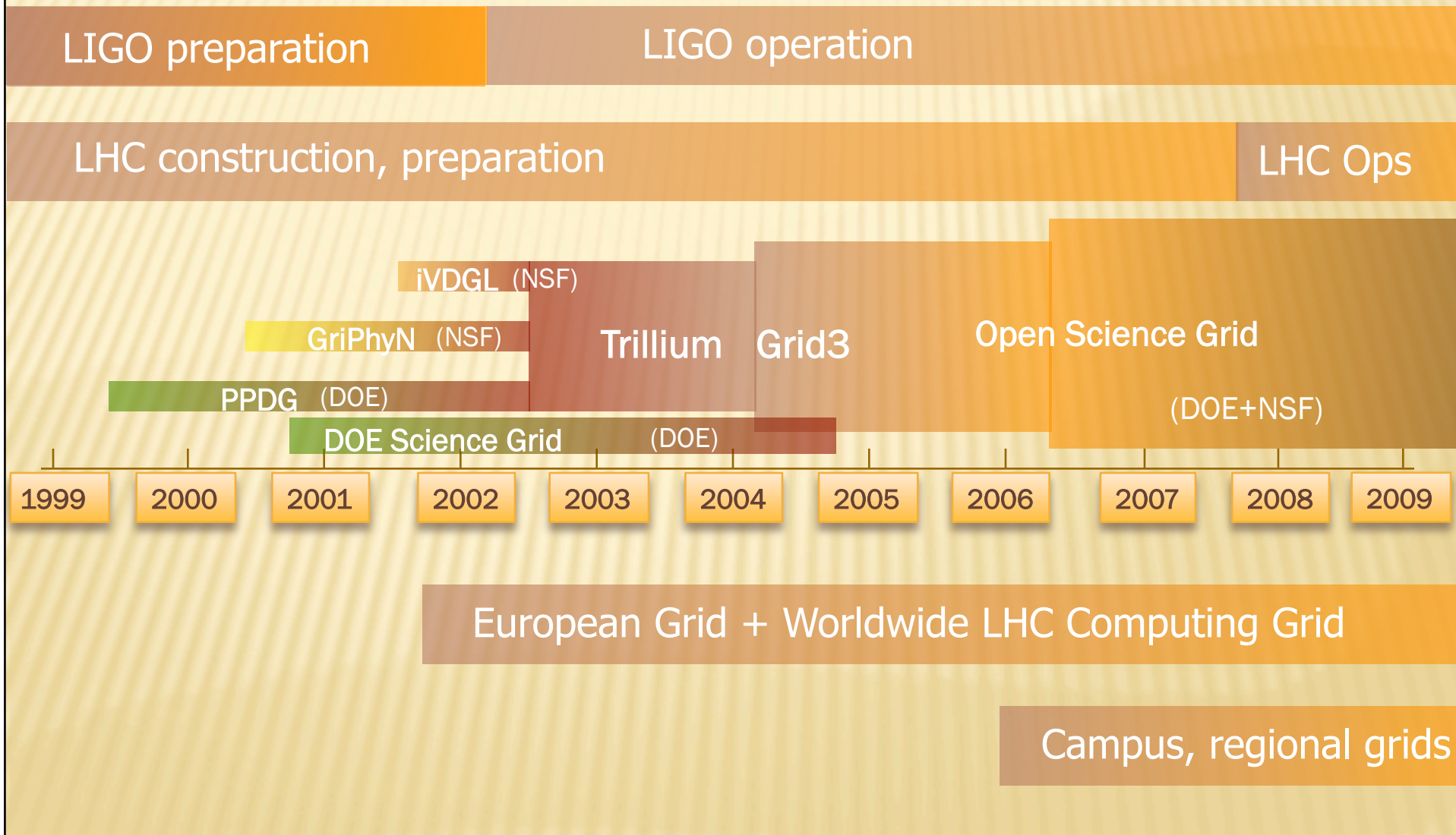


✘ Department of Energy SciDAC-2 Program

- + *High Energy Physics*
- + *Nuclear Physics*
- + *Advanced Software and Computing Research*



EMERGENCE OF THE OSG: *THE TIMELINE*

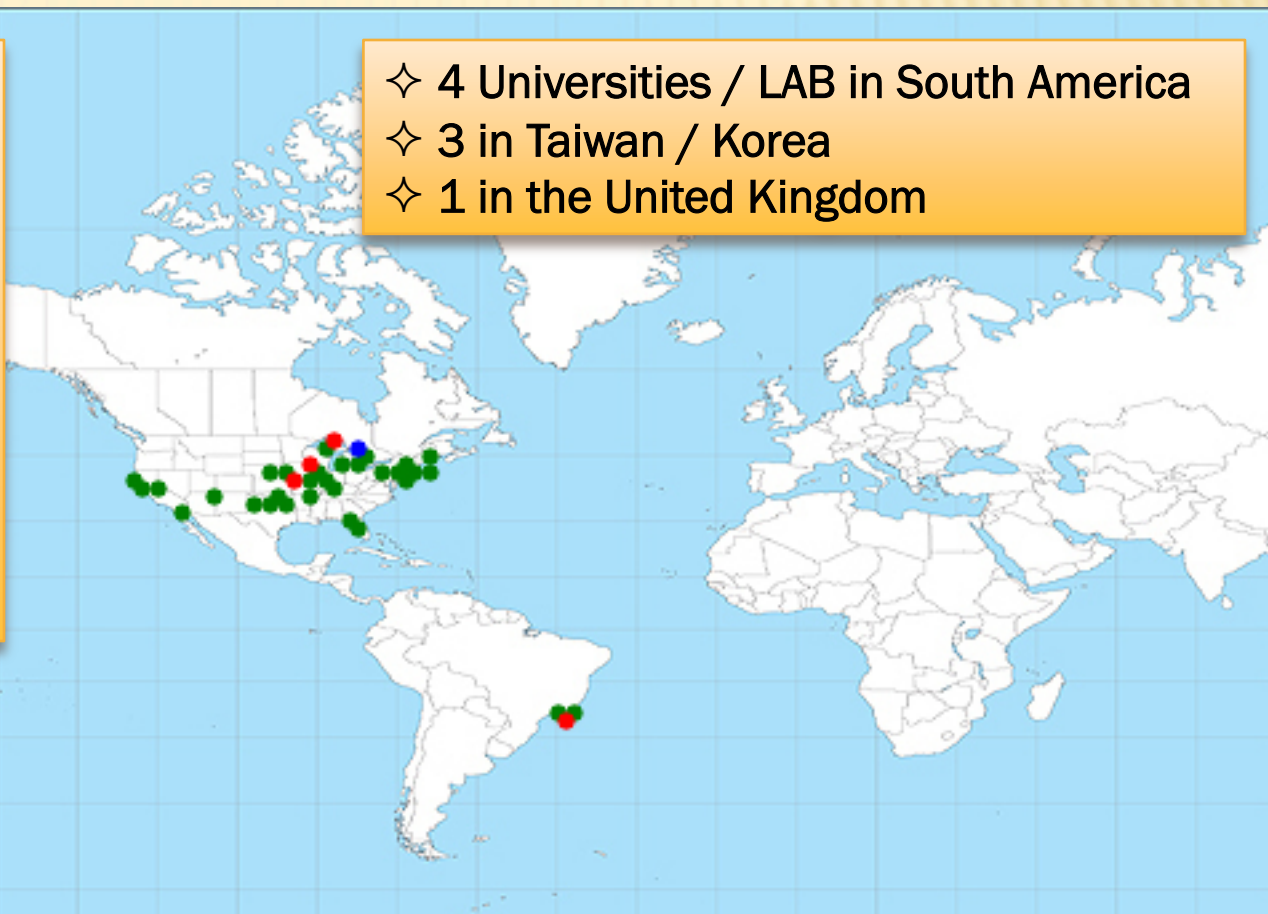


OSG GRID SITES: COMPUTING & STORAGE

- ✧ 81 OSG Production Sites
 - ✧ 43,000 Cores
 - ✧ 6 Petabytes Storage
 - ✧ 15 OSG Testbed Sites
- ✧ 30+ Virtual Organizations
- ✧ 75+ Institutions

- ✧ LIGO houses 3 Sites
 - UWM, MIT, PSU
 - Plus Testbed @ CIT

- ✧ 4 Universities / LAB in South America
- ✧ 3 in Taiwan / Korea
- ✧ 1 in the United Kingdom

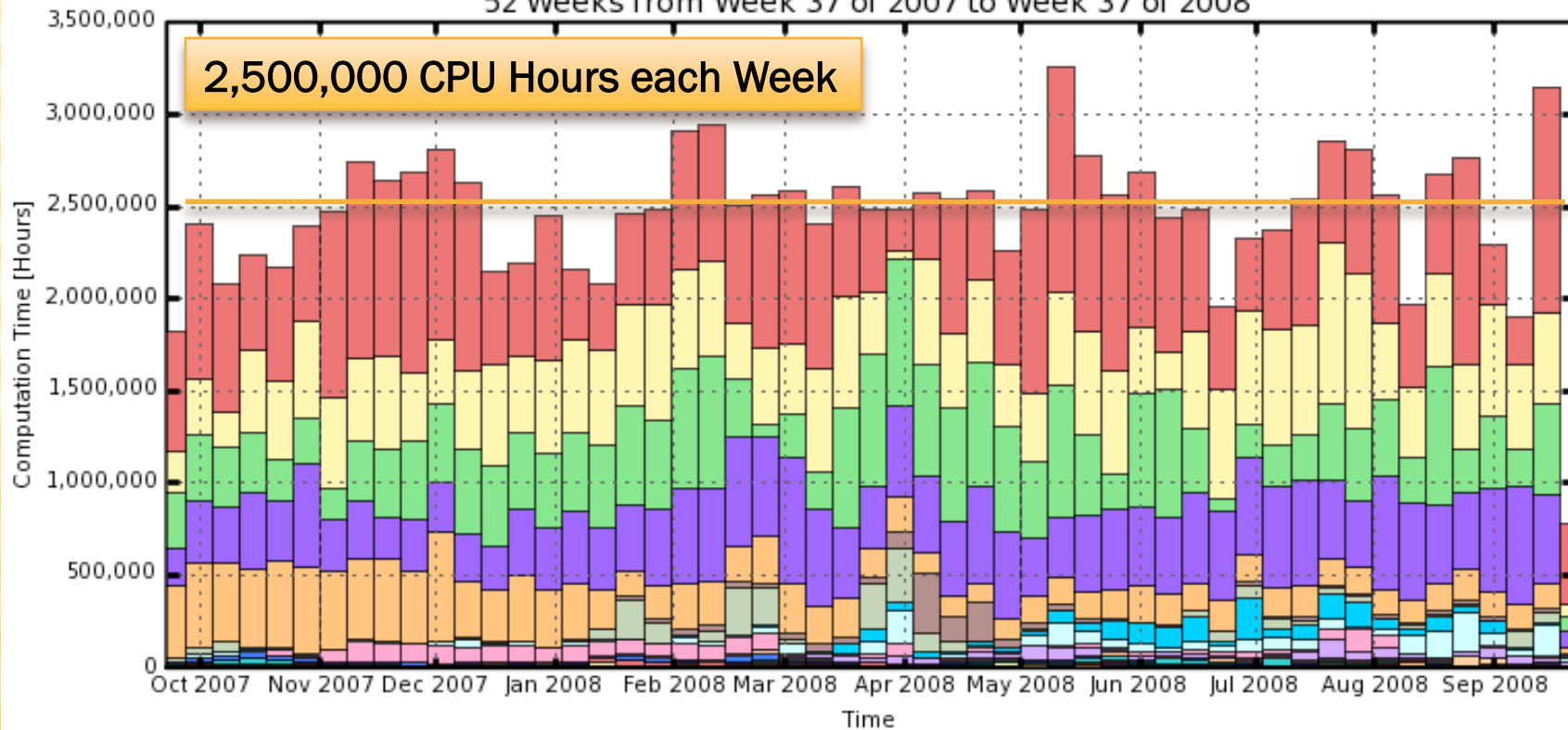


VDT/GLOBUS Software Stack

OSG'S COMPUTING CAPACITY

Computation Hours Per Week

52 Weeks from Week 37 of 2007 to Week 37 of 2008

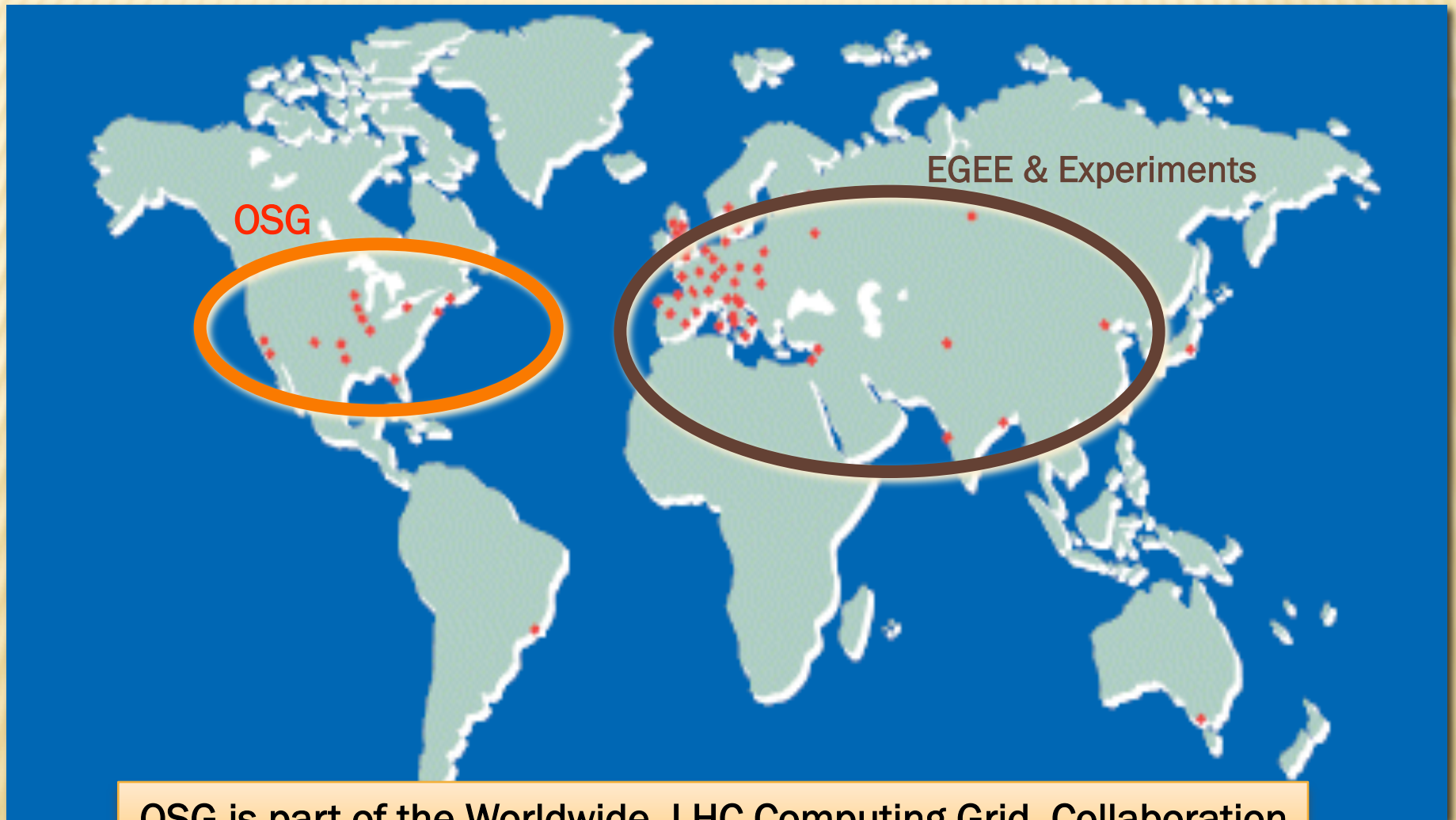


2,500,000 CPU Hours each Week

- cms
- cdf
- usatlas
- dzero
- unknown
- nysgrid
- miniboone
- ligo
- engage
- star
- minos
- Other
- dosar
- ilc
- other
- mipp
- osg
- nanohub
- accelerator
- hypercp

Maximum: 3,258,001 Hours, Minimum: 781,149 Hours, Average: 2,456,220 Hours, Current: 781,149 Hours

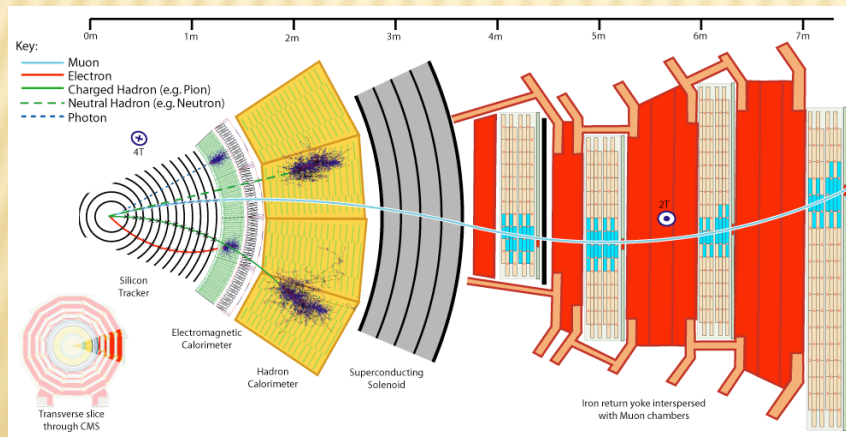
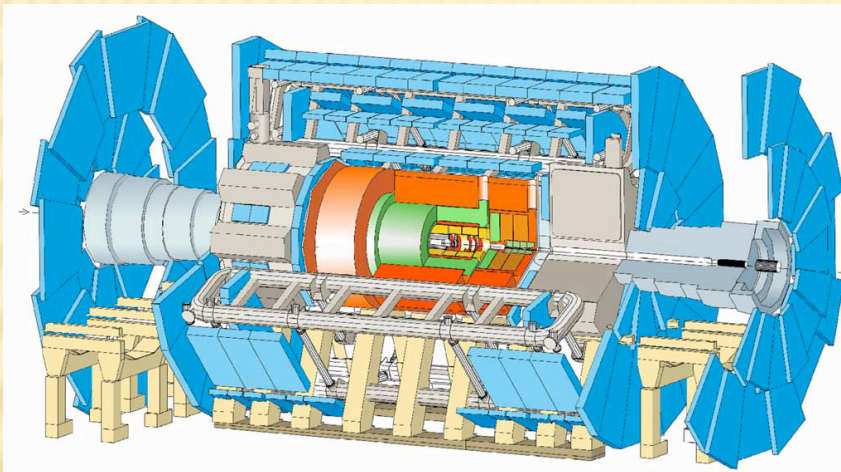
OSG IS A PARTNER IN INTERNATIONAL GRIDS



OSG is part of the Worldwide LHC Computing Grid Collaboration
(together with EGEE & the HEP Experiments)

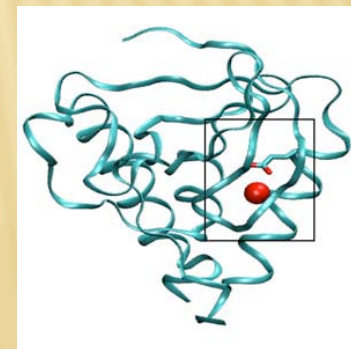
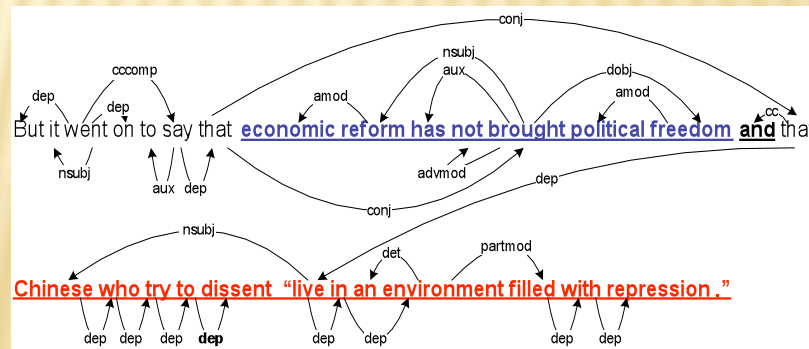
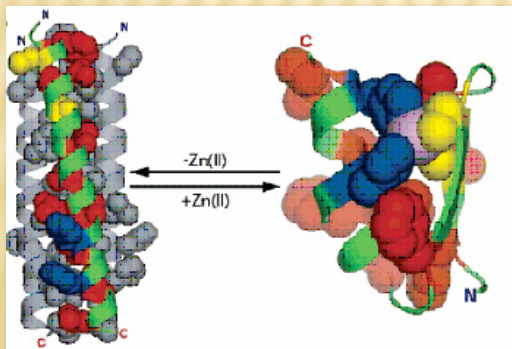
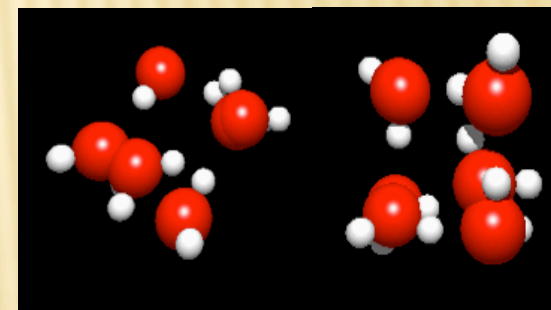
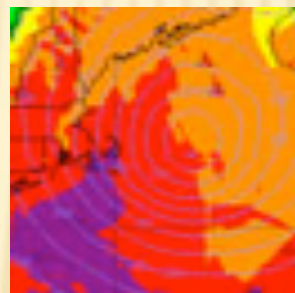
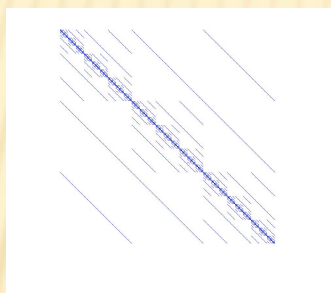
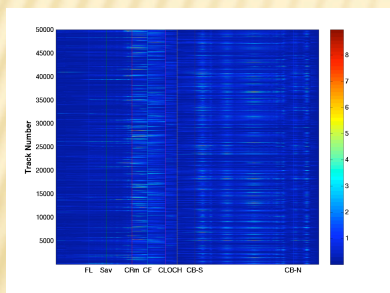
SUPPORTING PHYSICS STAKEHOLDERS

ATLAS, CMS, LIGO, ...



SUPPORTING NON-PHYSICS SCIENCES

Oceanography, Computational Chemistry, Computational Biology, Library Sciences, Climate Modeling, Gaming Theory, ...

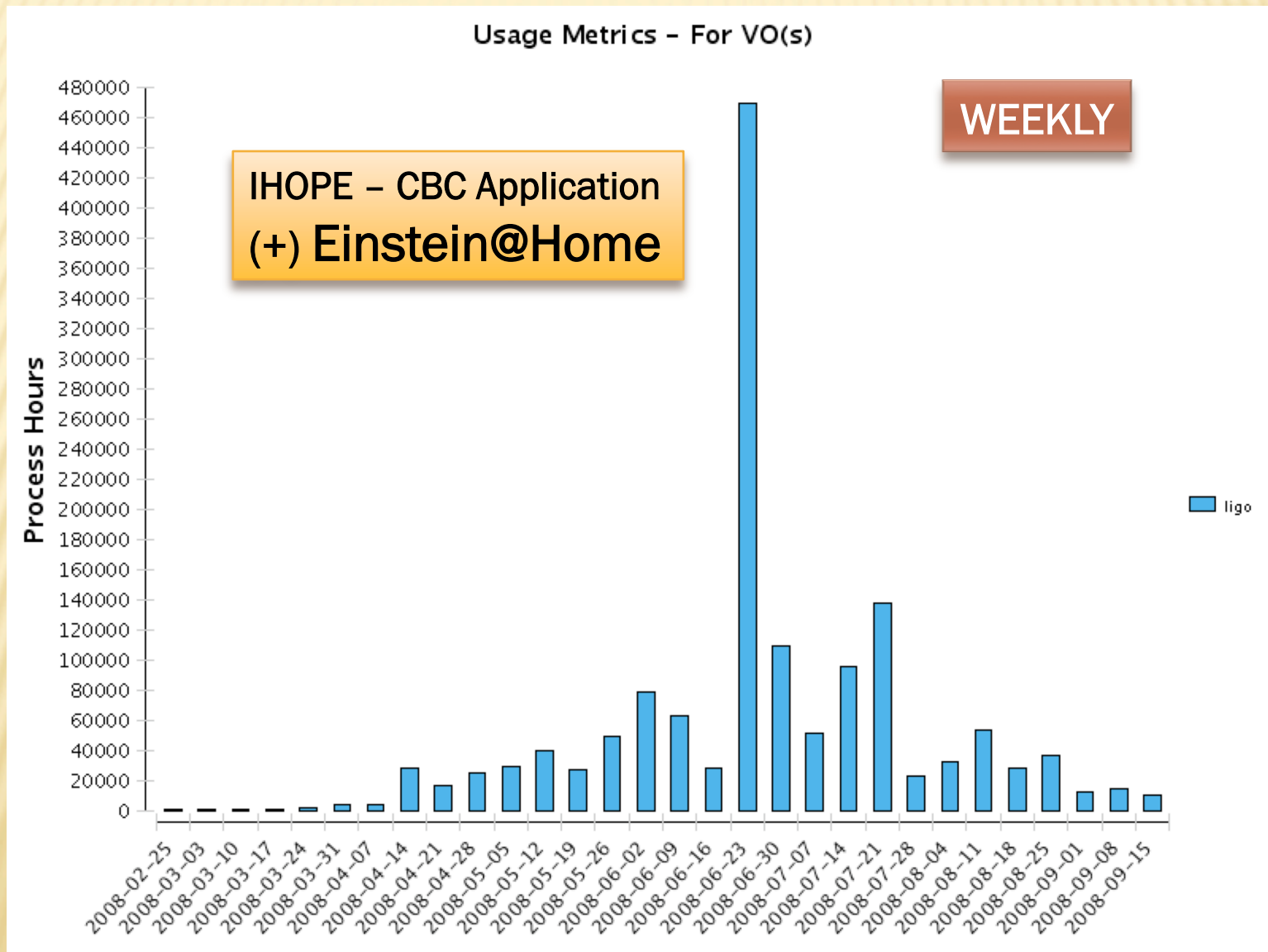


LIGO APPLICATIONS ON THE OSG

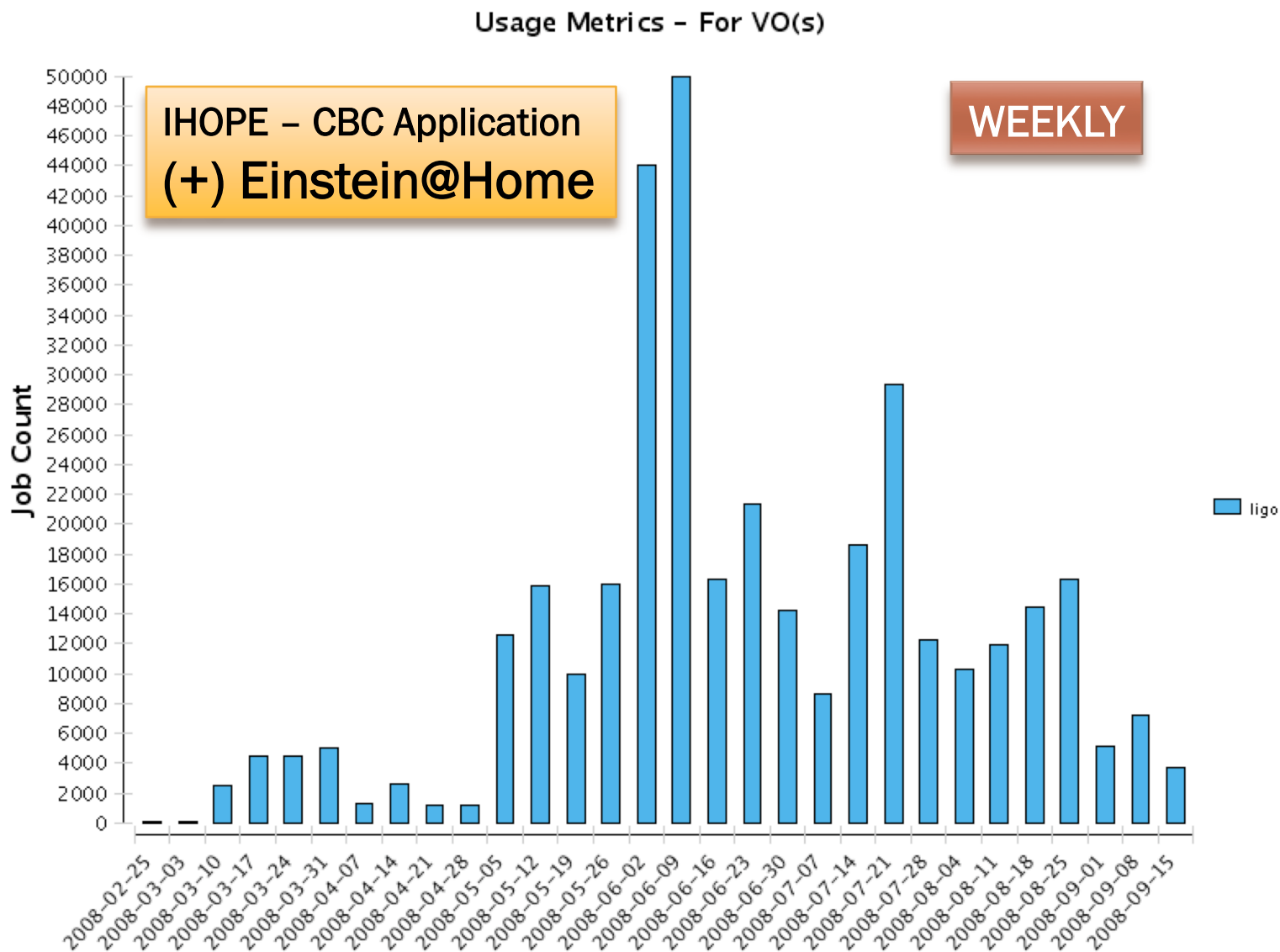
- ✘ Broad-reaching LIGO-Grid application team in place:
 - + Headed up by Britta Daudert at Caltech
 - + LSC Application developers
 - ✘ CBC – IHOPE
 - ✘ Pulsar – Einstein@Home
 - + Pegasus Workflow Developers from USC-ISI
 - + OSG VO Support and Troubleshooting Teams
 - + Oversight from the LSC Computer Committee and DASWG
 - + Have made significant progress with both Applications
 - ✘ Einstein@Home currently utilizing the bulk of LIGO’s OSG cycle
 - + Will be adding a new OSG funded staff member soon
 - + Goal to improve “Grid” transparency and efficiency on both the LIGO Data Grid and the Open Science Grid
 - + A new OSG Testbed to be established at Caltech this Fall.



OSG CPU HOURS USED BY LIGO THIS YEAR



OSG JOB SLOTS USED BY LIGO THIS YEAR



EINSTEIN@HOME ON THE GRID

Einstein@Home
World Year of Physics 2005

- ✧ It is this years OSG/LIGO Science Milestone
- ✧ Running on OSG since January 2008
- ✧ In combination with the German DGRID, hold 3rd place user statistics
- ✧ Using >5000 job slots per week (avg)

User stats

Users 1 - 100

Sorted on Total credit

Total number of users: 197947



Einstein@Home

last month	last week	last day	Pos.	User Name	Total credit	Credit /day	Credit /week	Credit /month	Average credit	Over take	Options
→0	→0	→0	1	Steffen Grunewald, for Merlin/Morgane	206,921,717	606,039	4,571,176	24,452,071	726,257	-	<input type="checkbox"/>
→0	→0	→0	2	Bruce Allen	158,541,694	0	0	0	1	-	<input type="checkbox"/>
→0	→0	→0	3	AEI eScience group, for the German Grid (D-Grid) and the Open Science Grid (OSG)	139,527,258	2,801,237	21,153,060	55,293,054	2,425,140	8	<input type="checkbox"/>
→0	→0	→0	4	UW-Madison CAE	68,334,005	30,108	259,335	1,396,695	38,629	-	<input type="checkbox"/>
→0	→0	→0	5	L&S IT Office	62,610,351	131,061	1,005,620	4,097,124	138,993	59	<input type="checkbox"/>
→0	→0	→0	6	Erik A. Espinoza	48,553,082	23,000	282,851	2,231,881	50,335	-	<input type="checkbox"/>
→0	→0	→0	7	LIGO Livingston LDAS	45,309,169	948	8,538	225,044	7,080	-	<input type="checkbox"/>
→0	→0	→0	8	UTSC Computing Labs	42,474,911	3,790	19,898	81,018	2,741	-	<input type="checkbox"/>
→0	→0	→0	9	UITS Computer Labs	42,065,464	33,886	250,956	1,093,532	36,025	13	<input type="checkbox"/>

LIGO'S PARTICIPATION IN THE OSG PROJECT

- ✘ LIGO have been influential in the development of the OSG through GriPhyN and iVDGL for ~10 years
- ✘ LIGO is a key stakeholder in the OSG, along with US ATLAS and US CMS
- ✘ LIGO holds governance seats on the OSG Council
 - + Kent Blackburn - OSG Council Co-Chair
 - + Patrick Brady - LIGO Council Representative
- ✘ LIGO holds positions on the OSG Executive Board
- ✘ Yearly LIGO scientific milestones on OSG resources are agreed jointly by OSG and LIGO Council Rep
- ✘ March 2009 OSG “All-Hands Meeting” at LLO

HOW TO LEARN MORE ABOUT THE OSG

- × Open Science Grid Website:
 - + <http://www.opensciencegrid.org>
- × OSG Newsletters:
 - + <http://www.opensciencegrid.org/osgnews>
- × International Science Grids This Week (iSGTW):
 - + <http://www.isgtw.org>
- × Attend an OSG Grid School
 - + <https://twiki.grid.iu.edu/bin/view/Education/MWGS08>
- × OSG “All-Hands” Meeting at LLO:
 - + March 2nd – 6th, 2009
- × **Closing Thought: What Grid based collaborations and partnerships does LSC-VIRGO imagine for its future?**