



Sean Crosby (Research Computing System Administrator and Developer, CoEPP)

## EXPLORING CLOUD TECHNOLOGIES WITH ENDEAVOUR EXECUTIVE FELLOWSHIP

Sean Crosby (Research Computing System Administrator and Developer, CoEPP Melbourne) will be participating in Cloud-related research computing work at CERN for a period of time as a recipient of the Endeavour Executive Fellowship awarded by the Australian Government Department of Education and Training.

The highly competitive, merit-based fellowship supports Australian and overseas recipients to undertake study, research and professional development programmes in another country.

Sean is one of 32 Australian citizens for the 2015 round.

"I thought it would be a great opportunity to do some professional development as part of another team. The Research Computing team at CoEPP have been given great encouragement to do professional development. This award gives me an awesome chance to be part of an already formed team and see how they do things."

"I received great help from Lucien and Caroline\* in drafting my proposal, and our friends at CERN also helped out. The supporting documentation from CERN, and outstanding referee reports helped greatly."

As part of the programme, Sean will be working as a member of the Cloud team who operate the Agile Infrastructure which underpins every service offered at CERN.

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Cloud computing is now becoming a big part of CERN and the Grid's computing capacity. Sean will be involved in some critically needed accounting, benchmarking and traceability work.

"Accounting is needed so that sites which provide cloud resources can get proper credit for their resources, and the traceability needs to improve so that in the event of any security breaches or problems occurring with virtual machines, we can trace the incident back and provide logs to help diagnosis. I'm currently doing lots of prep work researching the ways the Cloud infrastructure can store the data we need to collect to achieve the project goals."

Sean's upcoming trip to CERN will not only help the development of his current job but also CoEPP as a whole, because he'll be working more deeply with Cloud technologies.

"As most of CoEPP knows, we rely heavily on the Cloud provided by NeCTAR for our high throughput batch queue, and we also use it to supplement our Tier 2 compute facility provided to ATLAS. This will only grow in the coming years, and this is a great chance to work on providing the missing features needed to make Cloud systems fully integrate with our physical machines in our local data centre."

*\*Lucien Boland (Manager, Research Computing, CoEPP Melbourne); Caroline Hamilton (Communications and Outreach Coordinator, CoEPP Melbourne)*

# FROM THE DIRECTOR



2015 promises to be an exciting time for us here at CoEPP and we started the year in fine form with our annual scientific workshop in Hobart. Over 130 people participated making it the largest annual workshop to date. It was prefaced by a

summer school for our research students and an extremely well-received public lecture at UTAS by Prof Ray Volkas.

We're extremely excited about the LHC restart; at the higher energy of 13 TeV it heralds the beginning of a new era of discovery in particle physics. We've also had some great news about the dark matter experiment at Stawell Gold Mine – the State Government of Victoria has committed \$1.75m to this project, we'll

keep you posted on developments as they arise. Towards the end of 2014 we underwent our mid-term review by the ARC – the Centre is performing very well by all accounts. We've already begun thinking about the new Centre beyond CoEPP and are busy preparing our submission for the next round of Centre of Excellence funding.

In closing, particle physics is having a halcyon period and the Australian program, through CoEPP, is benefitting from the wave of developments in our field. Maintaining the momentum requires continued effort. The discussion and initial preparations for the next round of ARC Centres are well underway. With plans for an extended and broadened program, the capability for which is largely due to the success of CoEPP, we look forward to years of prosperity for Australian high-energy physics.

## COEPP PERSONNEL UPDATES

### ADELAIDE NODE

#### Farewells

-Dr Nitesh Soni, who will be working in modelling and analytics at Commonwealth Bank.  
-Nathan Hall (completed PhD student), who has taken up a Research Associate position at the University of Manitoba, Winnipeg, Canada.

#### Welcomes

-Dr Andreas Petridis, who will join Adelaide as a Research Associate (experimentalist), commencing on 11 May, 2015.  
-Dr Shivani Gupta, who joined on 8 September as a Visiting Research Associate.  
-New PhD students: Ali Abdullah M Alkathiri, Ankit Beniwal, Anum Qureshi, Damir Duvnjak, Daniel Murnane, Zachary Koumi.  
-New Honours students: Ben Geytenbeek\*, David Lawton, Desiree Brundin, Dylan Peukert, Henry Anderson, Jacob Bickerton, Jason Oliver, Josh Charvetto, Kim Somfleth, Robert Perry, Zachary Matthews.

### SYDNEY NODE

#### Farewells

-Dr Alexei Sibidanov will take up a Research Associate position at the University of Victoria, BC.  
-Dr Geng-Yuan Jeng will take up a Research Associate position at the University of Maryland.

#### Welcomes

-Postdocs: Dr Anthony Morley (experiment), Dr Jin Wang (experiment, expected to commence May/June).  
-PhD students: Carl Suster (experiment), Matthew Talia (theory).  
-New Honours students- Rupert Coy (theory), Suntharan Arunasalam (theory), Yunho Kim (theory), Lachlan Vaughan-Taylor (experiment).  
-Visiting Masters exchange student: Cyril Lagger (theory) from École polytechnique fédérale de Lausanne.

### MELBOURNE NODE

#### Farewells

-Masters student Sunny Vagnozzi has been offered a joint PhD position between the Nordic Institute for Theoretical Physics (NORDITA) and Stockholm University.  
-Paul Jäger has finished his study period as an exchange student at Melbourne.

#### Welcomes

-Ms Tracy Sproull, new CoEPP Finance Officer.  
-Dr Noel Dawe joined the experiment group in December 2014 as a Postdoctoral Research Fellow.  
-Experiment PhD students: Alexander Ermakov, Anders Huitfeldt, Brian Le, Cassandra Avram, Millie McDonald.  
-Theory PhD students: Alexander Millar.  
-Experiment Masters students: Andrew Duong, Braden Moore, Brendon Cheon, John Koo, Kim Smith, Steven Keyte, Wessam Badr.  
-Theory Masters students: Benjamin Graham, David Wakeham, Isaac Sanderson, Joshua Ellis,  
-3rd year Summer Student: Peter McNamara.

### MONASH NODE

#### Farewells

-Dr Sudhir Gupta left Monash node in November 2014 to take up a Postdoctoral position in Beijing, China.  
-Ben Farmer\* completed his PhD and left Monash node at the end of 2014 to take up a Postdoctoral position at the Oskar Klein Centre for Cosmoparticle Physics at the University of Stockholm.

#### Welcomes

-New Honours student, Andrew Lifson.



### Are you a budding artist? Scientist? Or both?

The Collision competition is now open for entries. You can submit animations, comics, drawings, short films – just as long as it's about particle physics. Winning high-school student entries will receive \$500 and \$1000 for their school. Open category winners will receive a cash prize of \$1500. Selected entries will be exhibited at the RiAus FutureSpace gallery and published in CSIRO's Double Helix magazine.

Visit <http://collision.org.au/> to find out more.

### \*Awards:

Adelaide CoEPP student **Ben Geytenbeek** has been awarded the **David Murray Prize** in Science for his work in 2014. The prize is awarded by the University of Adelaide annually to a student who has satisfied all the academic requirements for an ordinary degree or Level 3 of a 4 year program in the Faculty of Sciences and who has enrolled for the Honours degree.

Monash CoEPP student **Ben Farmer** was awarded the 2014 **Robert Street Doctoral Prize**. The prize is awarded annually to the candidate who produces the best PhD thesis, based on work carried out in the School of Physics & Astronomy at Monash University. Ben is currently undertaking a postdoc position in Stockholm. The ceremony, including Ben's acceptance speech via video, can be viewed here [https://www.youtube.com/watch?v=nw8j\\_IAN1lg](https://www.youtube.com/watch?v=nw8j_IAN1lg).

Congratulations to the following **CoEPP Scholarships** winners:  
Andrew Lifson (Monash)  
Ben Geytenbeek (Adelaide)  
David Wakeham (Melbourne)  
Suntharan Arunasalam (Sydney)  
**Relocation Assistance Awards**  
Cyril Lagger (Sydney)  
Isaac Sanderson (Melbourne)  
Wessam Badr (Melbourne)





Dr Peter Skands joined CoEPP Monash in October 2014 as an Associate Professor in theoretical particle physics. He holds an ARC Future Fellowship for research on “Virtual Colliders: high precision models for high energy physics” and has worked at Fermilab and CERN before coming to Australia. He received his PhD in 2004 from Lund University and is an author of the event generators PYTHIA and VINCIA.

## STAFF PROFILE WITH DR PETER SKANDS

**-What's your impression about Melbourne so far?** Melbourne deserves its great reputation for liveability and culture. Being from Northern Europe, we even quite like the weather here! We had a baby girl in January, and it entered into our decision that we think Australia is a good place for kids. It's lovely here and people are very welcoming. The only minus are the exorbitant house prices, so thus far we're renting. Still, we found a nice place near the bay, and we've had our first BBQ.

**-Why did you apply for this position in Monash? What are you currently working on?** Having worked only at labs for the last 10 years, I thought this would be a good opportunity to rejoin the university world. I like the people and the atmosphere both in CoEPP and at Monash, and I just think there's potential to do great things here. Ask me again in a few years, but right now I'm quite excited to get started teaching and supervising students. For instance we've just established a new joint PhD scholarship programme between the Monash theory group and the experimental group at Warwick University (UK), which we are now seeking applications for: <http://skands.physics.monash.edu/mwa/>.

**-What are some of the latest development for VINCIA and PYTHIA?** While I loved the five years I spent at CERN, it was also an

incredibly busy place (and time), so often the work on VINCIA had to be put on the back burner. At Monash, my PhD student Nadine Fischer has been making rapid progress on the mathematical calculations and writing the code that essentially extends VINCIA to hadron collisions, completing in a few months what I didn't manage in the last few years at CERN. Hopefully her code can be implemented soon and the novel approach to QCD corrections we take in VINCIA can then become part of the physics studies for Run 2 of the LHC. On PYTHIA, I have some plans eg for revising the string-fragmentation model, though that will probably have to wait till I find my next PhD student.

**-There is a Music section on your homepage <http://skands.physics.monash.edu/> How do you think your interest in music influences you as a physicist?** I've met many physicists who have strong connections with music. Patterns and variations are dear to our hearts I guess, and it's nice to be able to get a strong emotional high from them without having to solve equations. Improvising or writing it isn't that different from playing with physics ideas. Sometimes it just ends up sounding awful, but once in a while maybe you hit on something.

## LHC RUN 2: WHAT'S IN STORE?



Over the past two years it would seem that things have been pretty quiet at the LHC. It's been in a “long shutdown” phase for major repairs and upgrades. Just prior to shutdown, the LHC was operating at an energy of 8 TeV (Tera electronvolts). During the shutdown, every nook and cranny was inspected: 18 of the 1232 superconducting dipole magnets were replaced. Electrical systems were subject to more than 400,000 electrical tests, and newer, more radiation-tolerant systems were added. The cryogenics system was fortified and the control systems and cooling plant upgraded. It restarts at an unprecedented energy of 13 TeV, almost double the energy of its first run. This higher energy will allow physicists to extend the search for new particles and check previously untestable theories.

ATLAS was also upgraded during the long shutdown. Of significance was the installation of a new inner-most layer of the pixel detector, the insertable b-layer (IBL). The IBL will improve ATLAS' ability to identify b-quark jets, which are key to exploring both the properties of top quarks and Higgs bosons. It will also ensure that excellent charged particle tracking and vertex finding performance is maintained as the other older layers of the pixel detector degrade due to inevitable radiation damage.

ATLAS event reconstruction software also underwent a major upgrade, the CPU time needed to reconstruct an event decreased by a factor of 4 without affecting the physics performance. This will enable the ATLAS Tier 0 to handle the 1 kHz data rates expected from the ATLAS trigger.

Physicists are now keenly awaiting data of collisions at the highest energies ever attained at a particle collider. “Bring it on!”

### What do we hope to find?

The higher energy will allow the production of more particles and antiparticles. This will help researchers check to see if the properties of antimatter differ from those of matter. Higher energy collisions at the LHC will also allow more detailed characterisation of quark-gluon plasma – the hot primordial “soup” that existed a few millionths of a second after the big bang. Supersymmetric particles and evidence of extra dimensions could appear in high-energy collisions at the LHC. And of course, higher energies means the creation of more Higgs bosons, allowing physicists to measure this particle with greater precision.

Whatever happens, we know that we are entering uncharted territory.

**Special thanks to Dr Antonio Limosani (Chief Investigator, CoEPP) for contributing to the article.**

**\*At 10:41am, 5 April, CERN confirmed that a proton beam was back in the 27-kilometer ring, followed at 12.27pm by a second beam rotating in the opposite direction. This is the first proton beam detected in the accelerator after two years of waiting. (“Proton beams are back in the LHC”, CERN Updates)**



# COEPP ANNUAL SCIENTIFIC WORKSHOP (HOBART, AUSTRALIA, 17-20 FEB, 2015)

Presenter talks can be viewed here: [http://indico.cern.ch/e/CoEPP\\_workshop\\_2015](http://indico.cern.ch/e/CoEPP_workshop_2015)

Access key: Work\$hopHobart



As part of the Workshop, Professor Raymond Volkas (Director, CoEPP Melbourne) gave a public lecture titled *The Known Unknowns of the Universe* at University of Tasmania on Tuesday 17th February.



Left and Right: Dr Paul Jackson (ARC Future Fellow) and Dr Lawrence Lee (Postdoctoral Researcher, CoEPP Adelaide)  
Middle: Dr Noel Dawe (Postdoctoral Researcher, CoEPP Melbourne)



Left and Right: Ms Rebecca Leane and Ms Millie McDonald (PhD Students, CoEPP Melbourne)



Dr Daniele Zanzi (Postdoctoral Researcher, CoEPP Melbourne)



Associate Professor Kevin Varvell (Director, CoEPP Sydney)



Australian Government  
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MELBOURNE



MONASH  
University



THE UNIVERSITY OF  
SYDNEY



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