Status Overview

The Australian Synchrotron

Steven Banks
Control Systems Group

Where Are We?

Victoria
The Place To Be

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The Building

Artist's impression of the Australian Synchrotron

Development being managed by Major Projects Victoria (MPV)

Budget is AU$207M of which:

- AU$157M is funded by Victorian State Gov for machine
- AU$50M is funded from external sources for the beamlines

Commencing operation in March 2007

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The Building

Photo taken 15 March 2005

Facility is on land donated by Monash University (used to be a drive-in movie theatre)

We are 20km from City of Melbourne and 40km from the airport

Building is complete and the project team has been resident since Feb 2005

Two floors of offices around circumference
Ground floor is mostly laboratories

Initial suite of 9 experimental beamlines with space for at least 30 in the longer term

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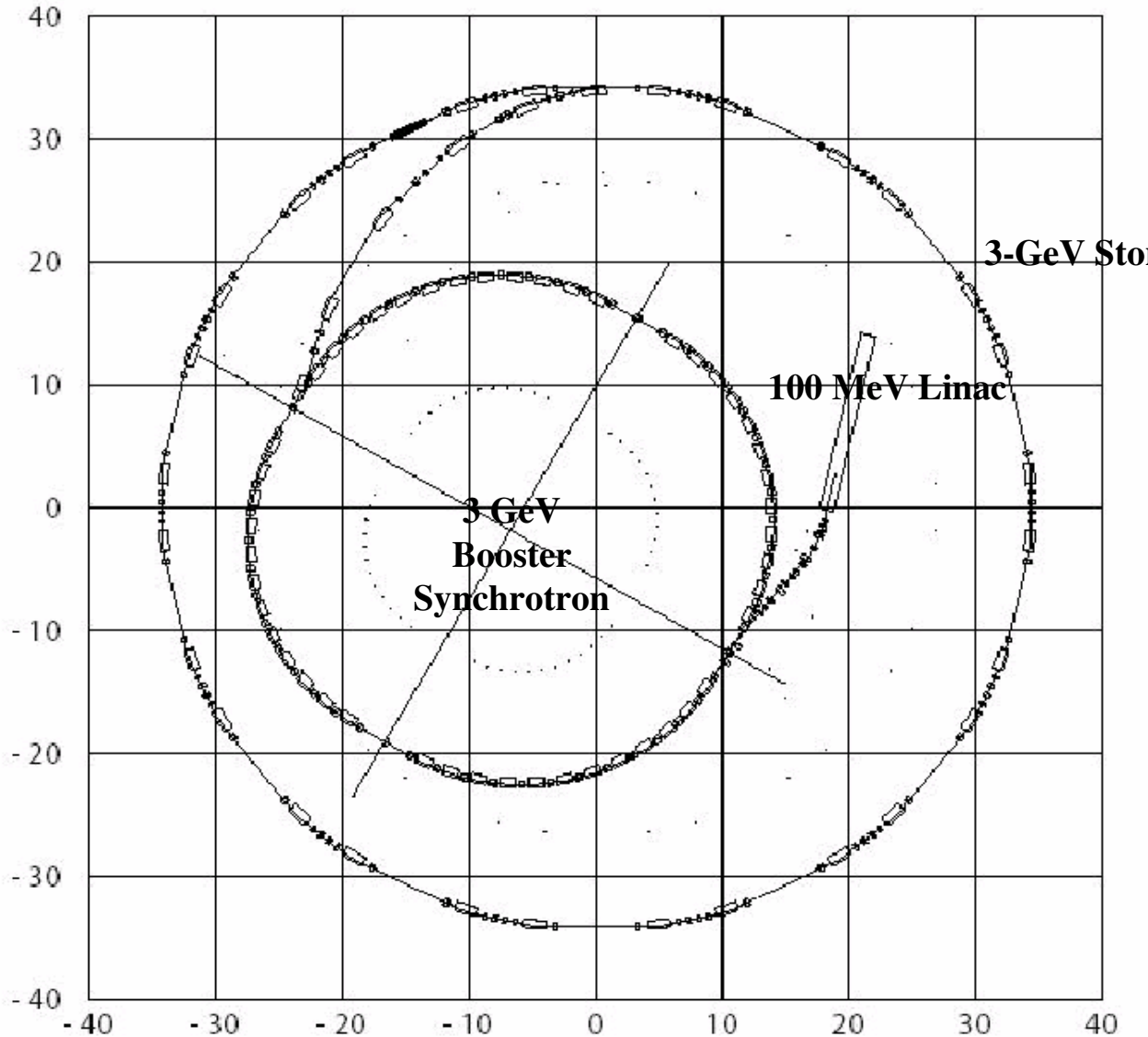
The Building

Artist's impression of the Australian Synchrotron building

The Building

Photo taken 7 September 2005


40
30
20
10
0
- 10
- 20
- 30
- 40
- 40
- 30
- 20
- 10
0
10
20
30
40
Meters
3-GeV Storage Ring
100 MeV Linac
3 GeV
Booster
Synchrotron

Internal View of Facility

View of Facility from outside my office

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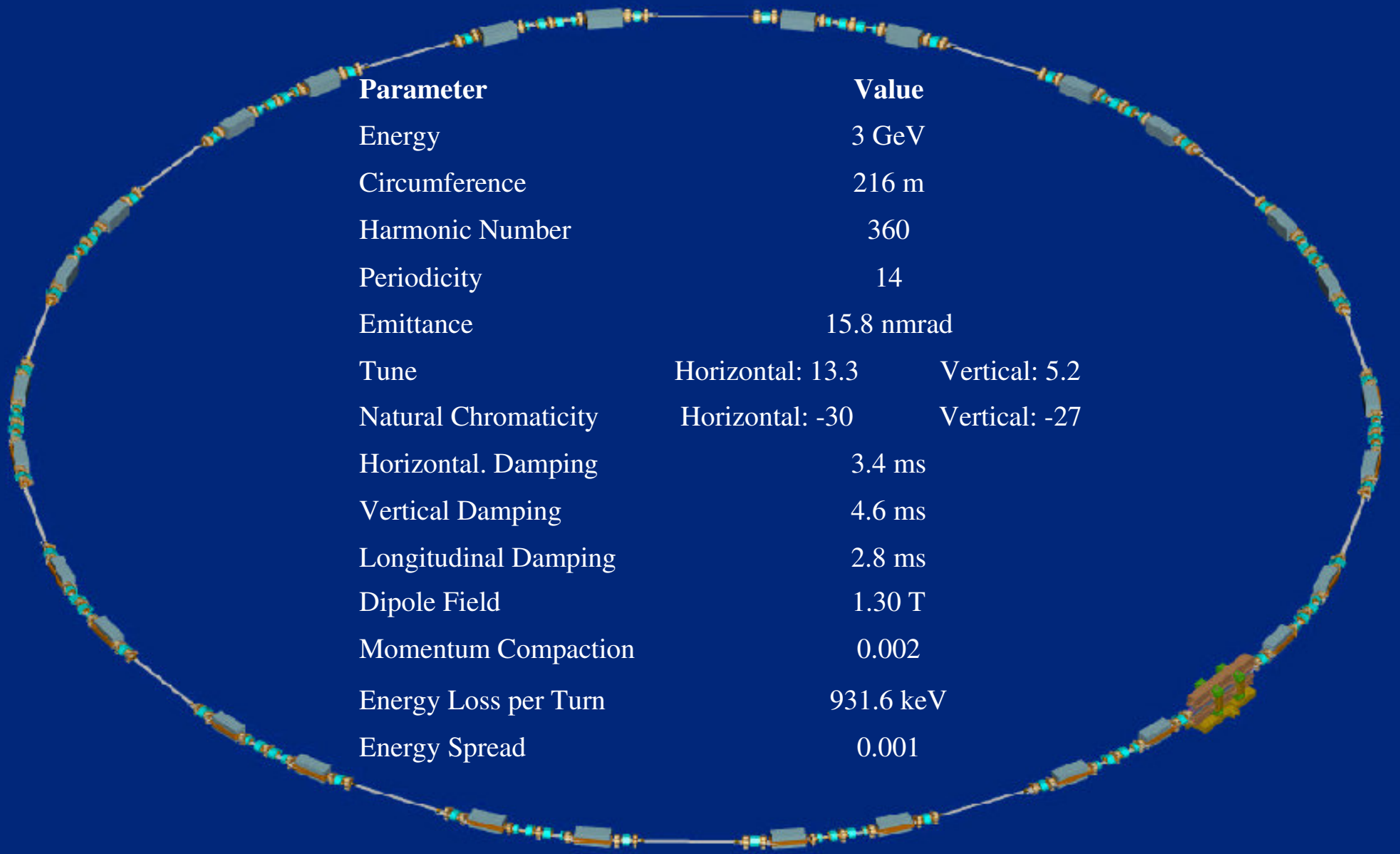
Storage Ring Parameters



Parameter	Value	
Energy	3 GeV	
Circumference	216 m	
Harmonic Number	360	
Periodicity	14	
Emittance	15.8 nmrad	
Tune	Horizontal: 13.3	Vertical: 5.2
Natural Chromaticity	Horizontal: -30	Vertical: -27
Horizontal. Damping	3.4 ms	
Vertical Damping	4.6 ms	
Longitudinal Damping	2.8 ms	
Dipole Field	1.30 T	
Momentum Compaction	0.002	
Energy Loss per Turn	931.6 keV	
Energy Spread	0.001	

Over 100 individual contracts:

▪ Conventional Facilities	Thiess	Australia
▪ Personnel Safety System	Sage	Australia
▪ Injection System	Danfysik (Cosylab, Accel, PPT)	Denmark
▪ Storage Ring Magnets	CMS Alphatec	New Zealand
▪ Pedestals and Girders	Metaltec	Australia
▪ SR Vacuum Chambers	FMB	Germany
▪ SR RF System	Toshiba	Japan
▪ SR Magnet Power Supplies	Danfysik (Cosylab) & Alpha Scientific	Denmark, USA
▪ SR Ion Pumps	Gamma Vacuum	USA
▪ SR Valves	VAT	Germany
▪ Beam Position Monitors	Instrument Technologies	Slovenia

Status of Facility

▪ Conventional Facilities	Completed in February 2005
▪ Personnel Safety System	Completed in September 2005
▪ Injection System	Beam from electron gun this week Linac commissioning underway All magnets installed
▪ Storage Ring Magnets	3 sectors installed Expected completion Feb 2006
▪ SR Pedestals and Girders	Most pedestals and some girders installed
▪ SR Vacuum Chambers	First chamber installed this week Expected completion Mar 2006
▪ SR RF System	Equipment on site and installation commenced Expected completion Mar 2006
▪ SR Magnet Power Supplies	Delivery commences this month Expected completion Mar 2006

Control System – Injection System

EPICS

- EPICS 3.14.6
- Sequencer 2.0.7
- Asyn 4-0 Driver

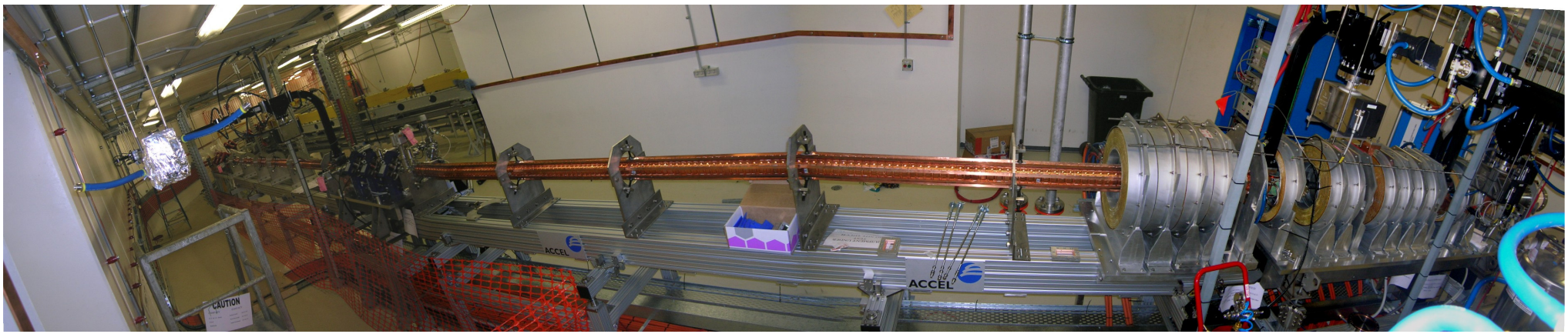
Hardware

- 20 PC104 microIOCs (from Cosylab) for LTB, Booster and BTS
- 1 x86-based computer (from PPT) for Linac
- 6 Siemens S7 PLCs for Equipment Protection

Software

- Debian Linux (from CosyLab)
- Linac software provided by PPT
- Booster software provided by Cosylab

Linac Panorama



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EPICS

- EPICS 3.14.6
- Sequencer 2.0.7
- Asyn 4-0 Driver (plan to upgrade to 4-3 soon)

Hardware

- 14 Industrial x86-based computers from Concurrent Computer Corporation
- 14 PC104 microIOCs (from Cosylab) for Magnet Power Supplies
- 2 Toshiba IOCs for RF System
- 98 Libera BPMs (from Instrument Technologies)
- 28 Moxa Serial to Ethernet Converters
- 7 Modicon PLCs running Unity Pro

Software

- RedHawk Linux from Concurrent Computer Corporation (real-time variant of RedHat Enterprise)
- Debian Linux for RF System and BPMs

Storage Ring Magnets

Installation of Storage Ring Vacuum Chamber

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EPICS

- EPICS 3.14.6
- Channel Archiver 2.1.8
- Alarm Handler 1.2.16 (ten archive engines)

Hardware

- Variety of dual-screen x86-based computers running Windows XP and RedHat Enterprise Linux
- File Server
- PSS Console
- Maintenance Console (for monitoring network, deploying software, variety of other maintenance applications)

Software

- Delphi 2005 for Operator Interface (see Andrew Starritt's talk for more info)
- MATLAB (Physicists)
- Bitscope Remote Oscilloscope monitoring software

Control Room

Magnet Power Supplies

- 1 Dipole PS – custom-built by Alpha Scientific (EPICS driver written)
- 308 Quad, Sext and Corrector PS – Danfysik System 7000 and 9000 (EPICS IOC software written by Cosylab)
- 4 Kicker PS – Design being carried out by Danfysik (EPICS driver planned)

Vacuum Pump/Gauges

- Gamma Multi Pump Controllers (EPICS driver written)
- MKS 937A Gauge Controllers (EPICS driver written)
- MKS Residual Gas Analysers (EPICS driver planned)

Other

- Omega DP470 6-channel Multi-Input Temperature Monitors (EPICS driver written)
- LCW Flow Meters (analog signals into PLCs)
- DCCT for beam current monitoring
- Beam Scrapers

All device drivers written using Asyn driver

We use Moxa boxes for all RS-232 devices

EPICS Courses

- November 2003 - Observatory Sciences
- November 2004 - Steve Hunt
- Valuable visits from Marty Kraimer/Steve Hunt/Bob Dalesio/Mark Rivers

Database

- Substantial use of template and substitution files (14-fold symmetry of SR)
- Some library templates developed (e.g. set-point/read-back comparison)
- Subroutine record used for beam lifetime calculation
- Asyn driver being used extensively for device drivers

Matlab

- Matlab Channel Access (MCA) substantially rewritten and extended

Borland Delphi Development

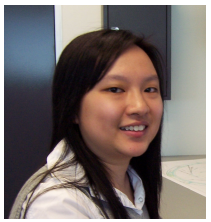
- Channel Access API developed
- Operator Interface application development framework developed
- Interface to Channel Archiver developed
- Interface to Alarm Handler developed

Who Are We?

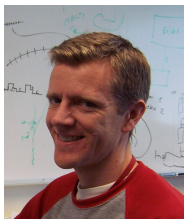
Richard Farnsworth	- Lead Control Systems Engineer
Steven Banks	- Control Systems Engineer
Mark Bennett	- Control Systems Engineer
Mark Clift	- Beamline Control Systems Engineer
Glenn Jackson	- Control Systems Engineer
Bryce Karnaghan	- Control Systems Engineer
Wayne Lewis	- Beamline Control Systems Engineer
Wendy Lim	- Control Systems Engineer
Andy Starritt	- Control Systems Engineer
Matthew Tuffin	- Technical IT Administrator









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More Information

www.synchrotron.vic.gov.au

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