Operations and Scheduling

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Change has never been a stranger to CHESS, and squeezing out the maximum benefit from the changes that do take place has always been a CHESS strength. The year 2001 consisted of a lengthy shutdown that encompassed many modifications that were driven by CHESS, such as the construction of the new CHESS G-line, as well as changes to improve the High Energy Physics operations of the Laboratory of Elementary Particle Physics (LEPP), formerly LNS, that operates the storage ring CESR.

Last summer the needs of the CHESS G-line consortium were a major influence in the down activities. Although LEPP personnel were diligently working on making improvements to CESR and the optics for tighter focusing with superconducting quadrupole magnets at the HEP detector CLEO, they were also heavily involved in the work to accommodate the new G-line. To accommodate the installation of the new 49-pole wiggler, which is the synchrotron radiation source for the new G-line and the refurbished A-line, LEPP personnel had to:

- Shift the location of the horizontal separator to place it where the old A-line wiggler was located
- Shift the position of two superconducting RF cavities to make room for the new wiggler
- Construct and install vacuum chambers that provide the vacuum pumping speed needed in the area to minimize the formation of Bremsstrahlung radiation
- Install the new CHESS A/G-line wiggler
- Provide a considerable increase in monitoring in the area to ensure the integrity of the vacuum in the area
- Shift the location of many utilities to accommodate the previously mentioned items

While all of this was being accomplished there was considerable work being done by the CHESS staff to accommodate the beams from the new wiggler:

- Cutting a large slot in the tunnel wall to permit access to the storage ring for G-line
- Installing the new front-end components of G-line, such as the beamstops, beam position monitors, Be windows, and other apertures
- Finishing up the construction of the new G-line experimental stations and optics cave
- Wiring the equipment and personnel safety components for all of the beamline components and experimental stations
- Repositioning the existing CHESS A-line to effectively use the new wiggler beam
- Installing a white beam mirror on the A-line to improve the optics and characteristics of the beam for the A1 station
- Refurbishing the A1 station optics to permit use of the mirror reflected beam that would be in a different location from the past

These changes brought numerous benefits to the facility. For example, although the average particle current was slightly lower (to improve reliability etc.) the High Energy Physics detector, CLEO, had record luminosities for the CLEO collaboration to make use of in their data analysis. This also permitted increases in the flexibility in the operations of CESR such that the laboratory explored different energies and areas of High Energy Physics, without detrimental effects on the synchrotron user community. In fact, even though many different energy regimes were explored (4.2 GeV to 5.7 GeV), the CHESS users received an increase in the reliability of operations from ~83% in the year 2001 to close to ~89% at the present time. While all of this was happening, the CHESS and MacCHESS staff was not coasting. In the past year we have performed numerous tests on the new G-line to ensure that the beam can be effectively stabilized during HEP while testing new techniques for beam position monitoring using various video techniques. The CHESS staff also was brought in to assist the G-line staff and graduate students in getting the G-line experimental stations to a point of operation with some basic optics, such that the stations could be used and developed at a much more rapid pace while permitting the ongoing development of the multilayer optics that will be installed in the near future (see article on page 25 by Joel Brock).

Other changes were made during the down that were of very practical use to the MacCHESS users, including the plumbing of liquid nitrogen directly to the CHESS East experimental stations F1 and F2 and upgraded detectors for the MacCHESS stations (see article on page 17 by Marian Szebenyi).

MacCHESS personnel were very busy during this past running period with assisting the macromolecular crystallography users as well as conducting numerous measurements for users in a mail-in-your-sample mode.

The recent shutdown in the summer of 2002 had some of the usual maintenance work being done to further improve the operating conditions of the storage ring; however, the driving force was work required as a first step in a new direction in operations for the entire laboratory. The CLEO collaboration is excited to start investigating charm physics. LEPP has installed a prototype superconducting wiggler that will be one of many, if given funding, that will be operated to aid in the charm physics running. This charm physics running is at a new energy regime that will bring about many changes for the CHESS laboratory. This new low energy regime (~1.9GeV compared to current typical energies of ~5GeV) would provide a considerable reduction in synchrotron radiation to the CHESS experimental stations. There is bad news and good news from this point. The bad news is that the reduction in intensity is so severe that it precludes the running of the CHESS facility during these particular HEP running periods. The "great" news is that the laboratory will make amends by providing periods of dedicated running for CHESS, which will have many benefits to the users as a whole. For example, the dedicated running periods will have the properties that most all of the CHESS users want:

- Smaller beam sizes at the source. There is a special lattice that has been designed to reduce the particle beam sizes (nominally by a factor of 2 in area) to improve the brightness and brilliance of the beams to the CHESS users.
- Increased experimental run lengths. With the new lattice and the lack of collisions in the HEP detector it is anticipated that we will increase the run lengths from the present maximum of 2 hours to about 6 hours in length. This will have the effect of improving repeatability due to the fact that there would be fewer interruptions for injection etc.
- Improvement in beam stability. The storage ring is intrinsically a very stable machine, but the particle beams are generally fine tuned throughout the HEP runs to maximize luminosity, which can affect the position and stability of the synchrotron beams. Without this tuning for the luminosity it has been shown that the stability and reproducibility of the beams will improve even more.

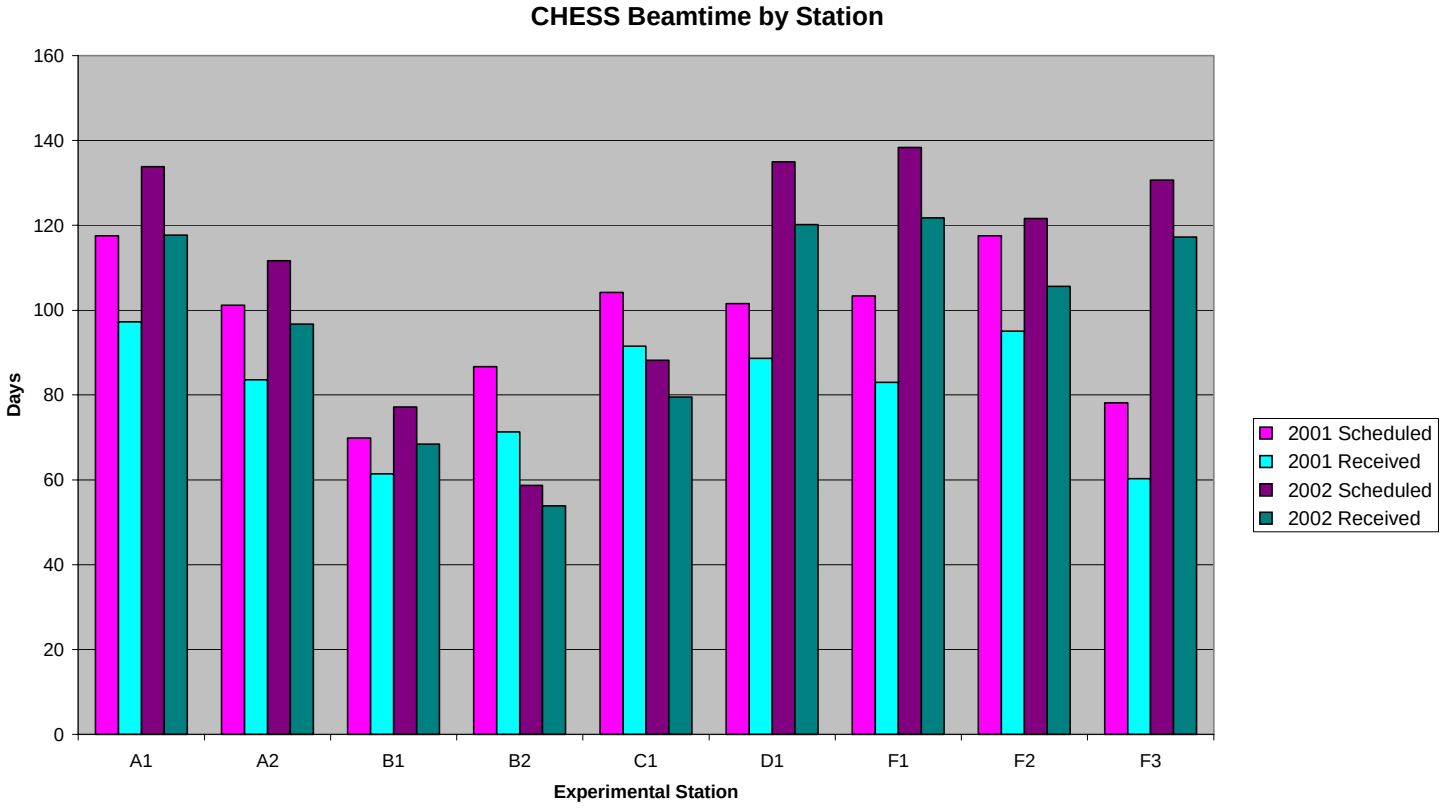
This new mode of operation will not be happening overnight and we will actually be running normal operations periodically for the remainder of 2002. However, we have already scheduled the first dedicated running period to start in January of 2003 and last for several weeks.

During the summer of 2002 shutdown, CHESS was diligently upgrading the optics chambers for the A2 station, while MacCHESS was getting the majority of the plumbing in place to deliver liquid nitrogen to the A1 station.

As per usual at CHESS, we find that the staff is in constant demand elsewhere and people have changes in their life that lead to them moving on. We have had a large number of changes in staff since the last CHESS newsletter that we would like to inform you of. One individual that had been here from the laboratory's founding is Vic Pollock. Vic had always been the person to go to with any electrical problems or electrical design needs that one had, as well as being a computer-networking expert. But he has decided to retire at a relatively young age so that he can enjoy his retirement time. His work is seen throughout the laboratory and he will be greatly missed. Randy Headrick left CHESS last year to go to the Green Hills of the University of Vermont, but luckily we still have a bit of a hold on him since he is still heavily involved as a user and collaborator with the new G3 experimental station. The jovial Karl Smolenski left CHESS last year to go to work designing beamlines for Oxford in England, but we luckily lured him back to the area and although he doesn't work for CHESS per se, he is often seen in the laboratory since he was hired by LEPP. The operations staff also lost the CHESS operator Roger Hasse who moved to warmer and less "humid" conditions in Louisiana. We have been very fortunate that we have had only one operator leave recently. The operators' pool is always difficult to fill with qualified and enthusiastic individuals and we feel

fortunate that we have been able to do so with the addition of the three operators Lee Geiger, Tony Lloyd, and Jonathan Page. They all have been very supportive and a great addition to the previously existing group of operators Brian Clasby, David Jones, Tom Krawczyk, Ted Luddy, Bob Seeley, Lee Shelp and Phil Sorenson. We have filled other positions that were open due to people leaving. Darol Chamberlain has been hired to assist with electronics design and support in a role similar to that of Vic. We've been fortunate to add Alexander Kazimirov as a staff scientist to assist the A2 users as well as with multilayer optics. Alex has come to CHESS after working with ex-CHESS staff scientist Mike Bedzyk at the APS. Arthur Woll, whom many might know as Randy Headrick's former right hand, received his PhD and recently returned to CHESS as a staff scientist. Jim Savino was hired as an engineer when Karl left CHESS and has been very actively involved with optics design as well as with other items around the laboratory. Frank Labonte has been hired by CHESS/MacCHESS for computer support and is heavily involved in the installation of a supercomputer for the laboratory. In addition to the people that have been hired in these roles, CHESS has increasingly seen the need for additional assistance in beam position monitor design and feedback. A new staff scientist position was created to assist in this effort and has been filled by Peter Revesz, who has been instrumental in the design and implementation of a variety of new monitoring schemes. In addition we have the post-doc Andrew Stewart who has come to CHESS from Glasgow University to assist Qun Shen in his work on phasing methods development. Thinking even further into the future and perhaps the construction of an Energy Recovery LINAC, CHESS and LEPP have hired Ivan Bazarov to assist in ERL design and machine lattice work.

As discussed above, the laboratory will be venturing into many new areas of operation. This makes it difficult to provide information regarding scheduling for the upcoming year or so, but CHESS will be notifying the user community of major scheduling items and the user can remain informed about the activities and schedule at CHESS by consulting the CHESS web site www.chess.cornell.edu. Improving the operations and conditions for the synchrotron user community is always foremost on the minds of all of the CHESS and MacCHESS staff, and we look forward to continuing to ever improve experimental resources.



Station by station use since 2001 shows that the user satisfaction (which is related to % received/scheduled) has increased from ~83% in 2001 to ~89% in 2002. The year 2003 will include a long down period for additional modifications and upgrades, but CHESS will be operated for a similar number of days with most of those in a dedicated mode that will increase productivity and reliability even further.