



PACS Newsletter

Nr. 18, 22 June 2007



The PACS Picture of last month



Fig.1: PACS leaves MPE after ILT-2 for what was then believed the final delivery to industry.

Status

Imagine it is ground hog day: you wake up – and PACS is back in the lab! Oh no, you will cry. Oh yes, we will reply! But let's be chronologic:


In the last issue of the PACS Newsletter we reported about the completion of the ILT Phase II and the improvements achieved in terms of optics alignment and mechanism control. Subsequently, PACS was warmed up and prepared for delivery to industry (see Figures 1 and 2). As reported in the last Newsletter, the repair of the optics alignment was significant, but not 100% complete because some optics elements were not accessible when we partially opened the FPU after Christmas.

An alert by KT on a potentially critical filter wheel problem forced us (and convinced Project to accept (if not agree)) to open the spectrometer compartment lid after Phase 2. As a blessing in disguise this also gave access for another correction of the misalignment. B.t.w., the filter wheels were ok.

The final spectrometer adjustment (a tilt of the last mirror before the detectors by 0.2° , i.e. $2/3$ of a pixel) was executed on April 26 (see Figure 3a). It required the adjustment of only one pin and was supposed to recover the full FOV of the spectrometer. Immediately after the adjustment we had to deliver PACS, so we could not test if the adjustment was indeed successful.



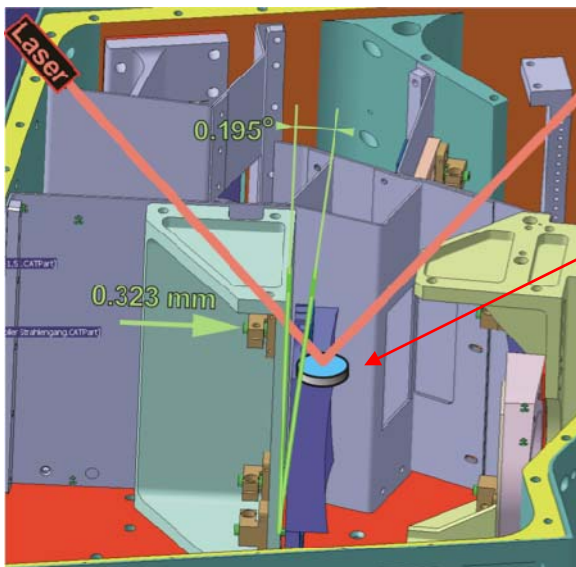
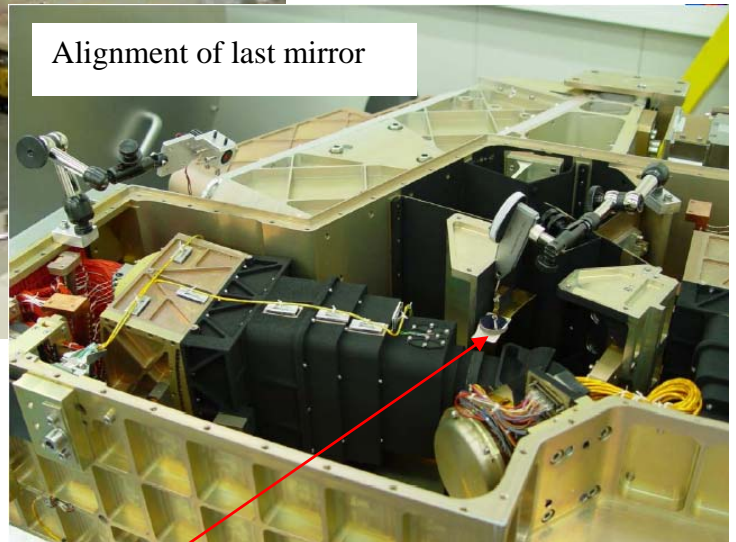
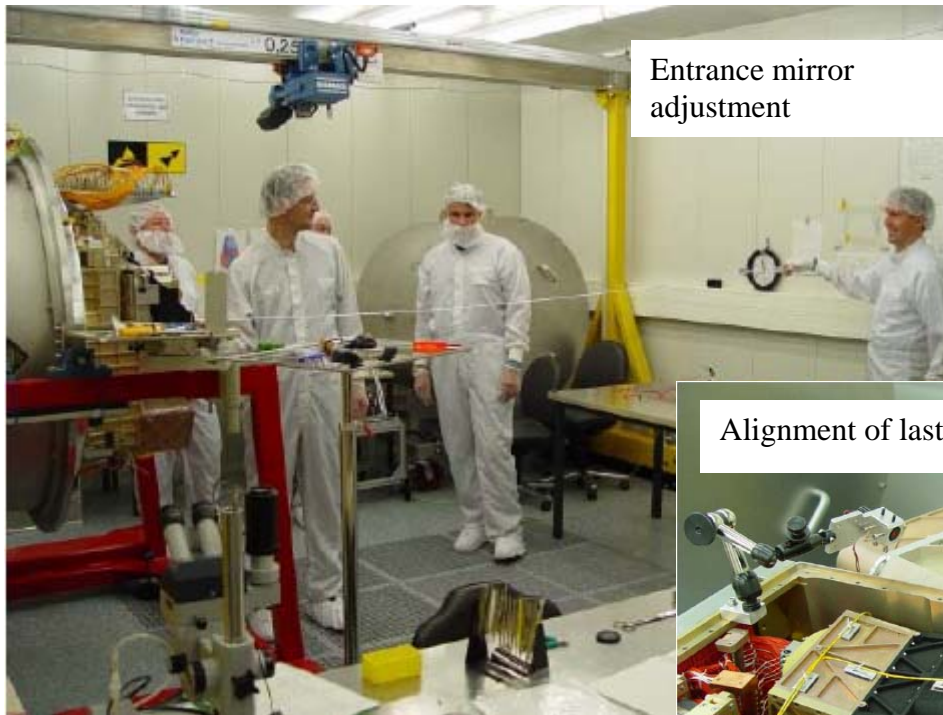
Fig.2: delivery readiness after ILT-2

Shortly after the delivery () we were informed about certain delays in the Herschel project and that we could have the instrument back for further testing. This was a nerve-wracking piece of news for the stressed test team, but it also meant an enormous chance to verify the last minute adjustments of the optics, and to complete those important tests that we could not do in Phases 1 and 2, like the characterisation of the spatial distortion, the PSF, or a new s/w concept to improve the chopper stability. So we bit the bullet and created an ILT Phase 3 plan, again with a 24 hours per day and 7 days a week schedule, over a period of 13 cold test days in total.

These tests went very well, and the cold part was finished yesterday (Thursday) as planned. We will (re-)deliver the warm electronics on July 3 and the FPU on July 6.

ILT-3 Results (preliminary)

- *Optical alignment*: the additional repair after ILT-2 was 100% successful! All 25 spatial pixels (spaxels) of the spectrometer are evenly illuminated now (Figures 4 and 5).
- *Spectrometer responsivity*: the NEP map (Figure 6) shows, in addition to a complete illumination of the array, that all pixels are close to or better than the specification.
- *Chopper*: the improvement in the chopper control and behaviour is shown in Figure 7. Note that during ILT1 (left panels) a different chopper was used (the FS model), which had at this time an already damaged flex pivot. Also, during these tests a different version of the DEC/MEC (QM) was used leading to different position read-backs for the same elongation. The results for ILT2 (middle panels), therefore, represent the first optimisation attempts with the current (FM1 model) chopper and FM DEC/MEC. The chopper parameters used for the 8 degree chop had been optimised for a 4 degree chop. In principle during ILT2 we had found a faster parameter set for the 8 degree chop, but, as the chopper has to be operated with a single parameter set for the full angle range, the best parameter set for the smaller angle was applied. Now, during ILT3 (right panels), a new software feature (elliptical filter) of the chopper controller has been implemented, overcoming the need for different parameter sets for the two ranges <4 deg and 4 to 9 deg. This gave a dramatic improvement in chopper performances, resulting in transition times well below 30 ms for the chop between the two calibration sources.
- *Filter Wheels*: new, improved commanding strategy (e.g. various thresholds) tested and working well
- *Grating*: performance and wavelength calibration basically unchanged
- *Photometer*: the point source tests show single images again! The PSF is close to – probably within - specification. A potential slight astigmatism (asymmetric elongation of the PSF when out of focus) is currently under investigation. The raster tests with the point source on an xy-stage were successful, i.e. the spatial characteristics of the arrays could be mapped out completely. Methods to improve the sensitivity in DDCS mode were investigated, but further data analysis is needed.



Auxiliary adjustment mirror

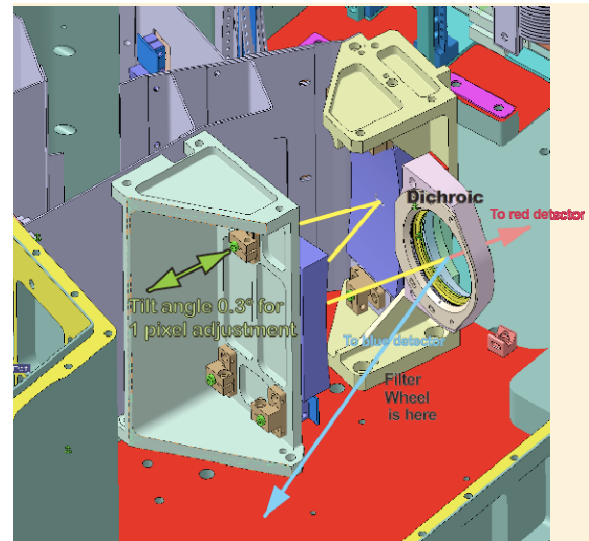


Fig. 3a: the last alignment repair after ILT-2

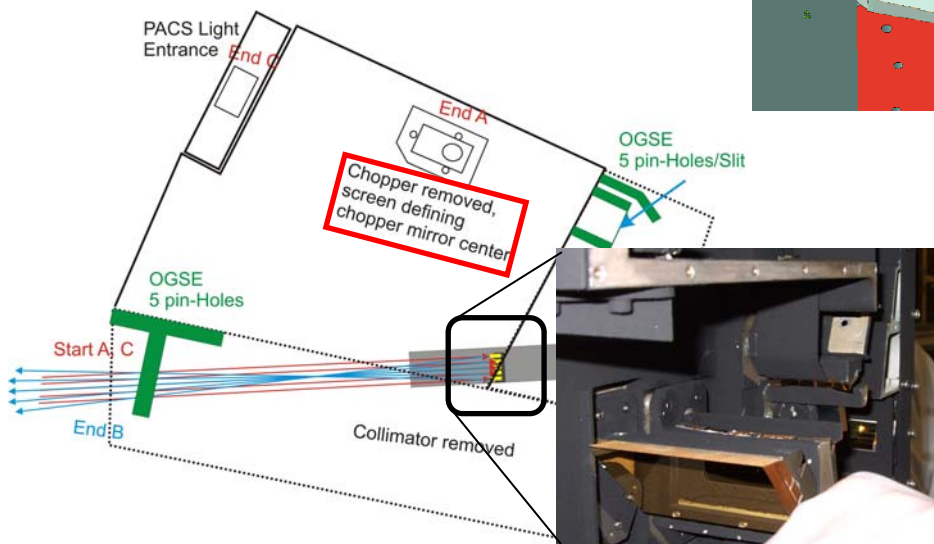


Fig. 3b: the first alignment repair after ILT-1

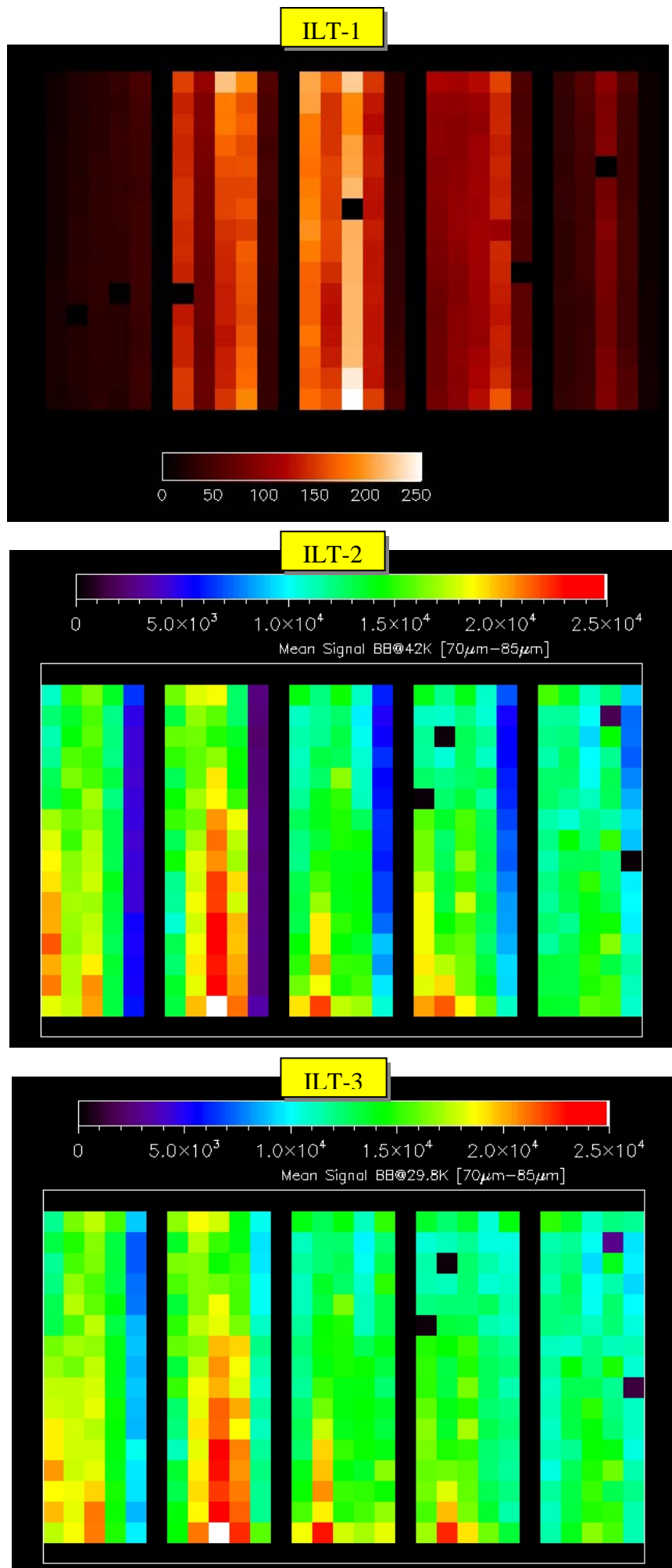


Fig.4: Illumination of the blue spectrometer array in a sequence from ILT-1 (top) to ILT-2 (middle) to ILT-3 (bottom)

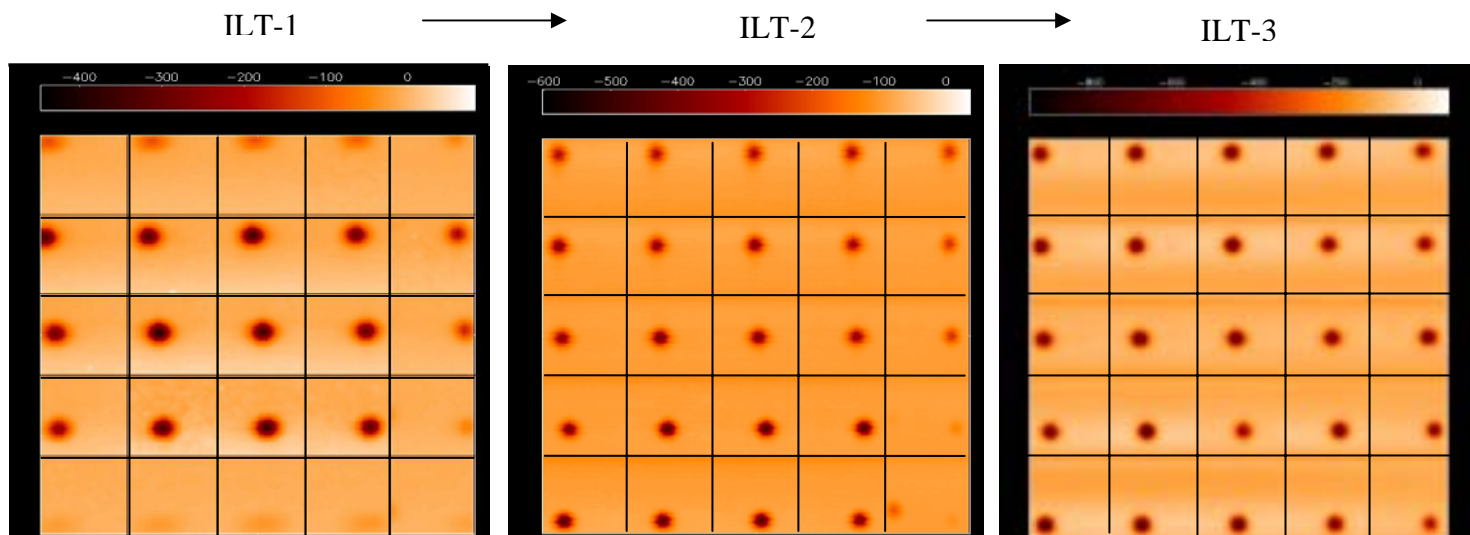


Fig.5: PSF map before and after FPU repairs on the spectrometer optics (PSF/FPU coverage), blue band ($77\mu\text{m}$).

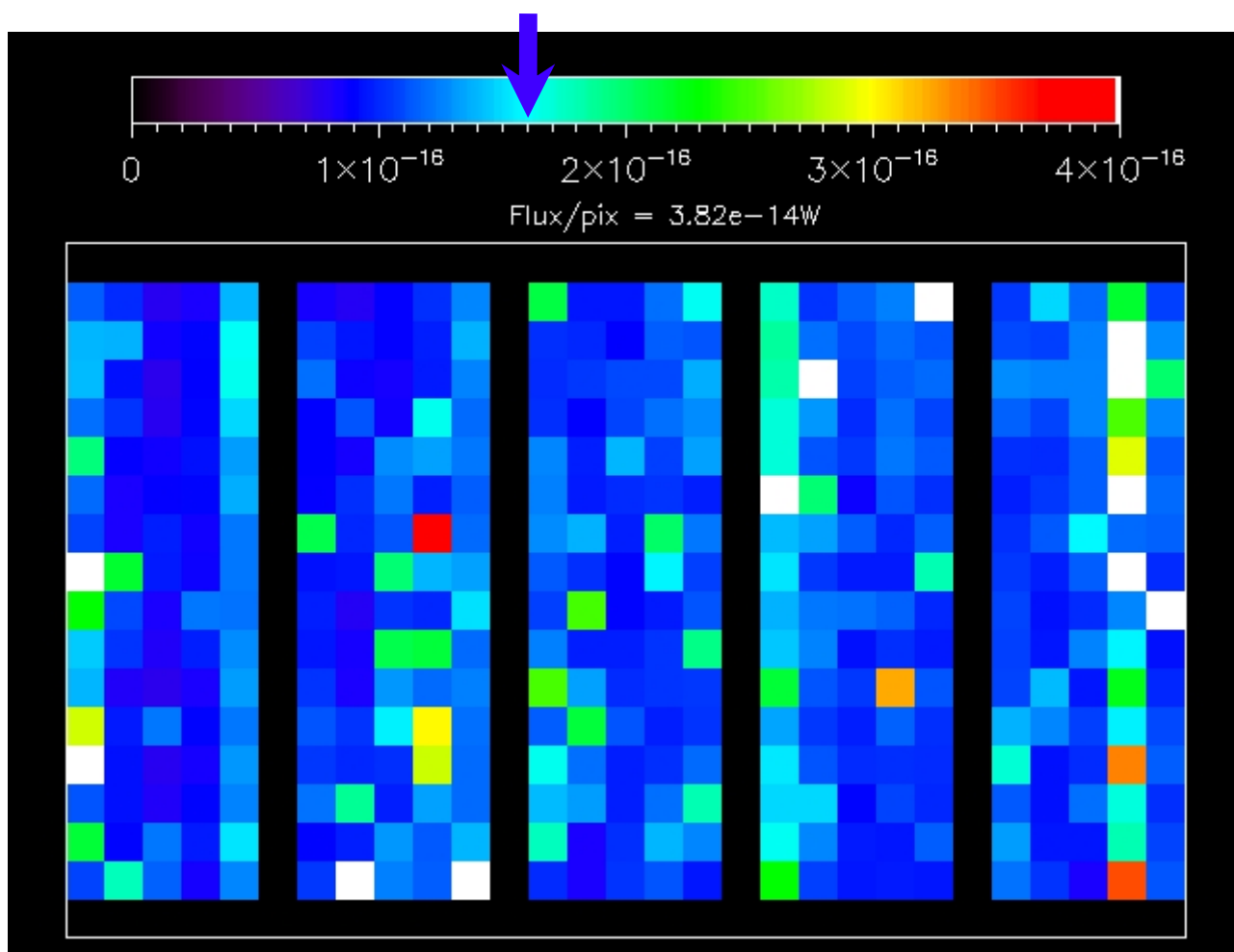


Fig.6: NEP map of the blue spectrometer in ILT-3. The arrow indicates that colour that corresponds to the requirements.

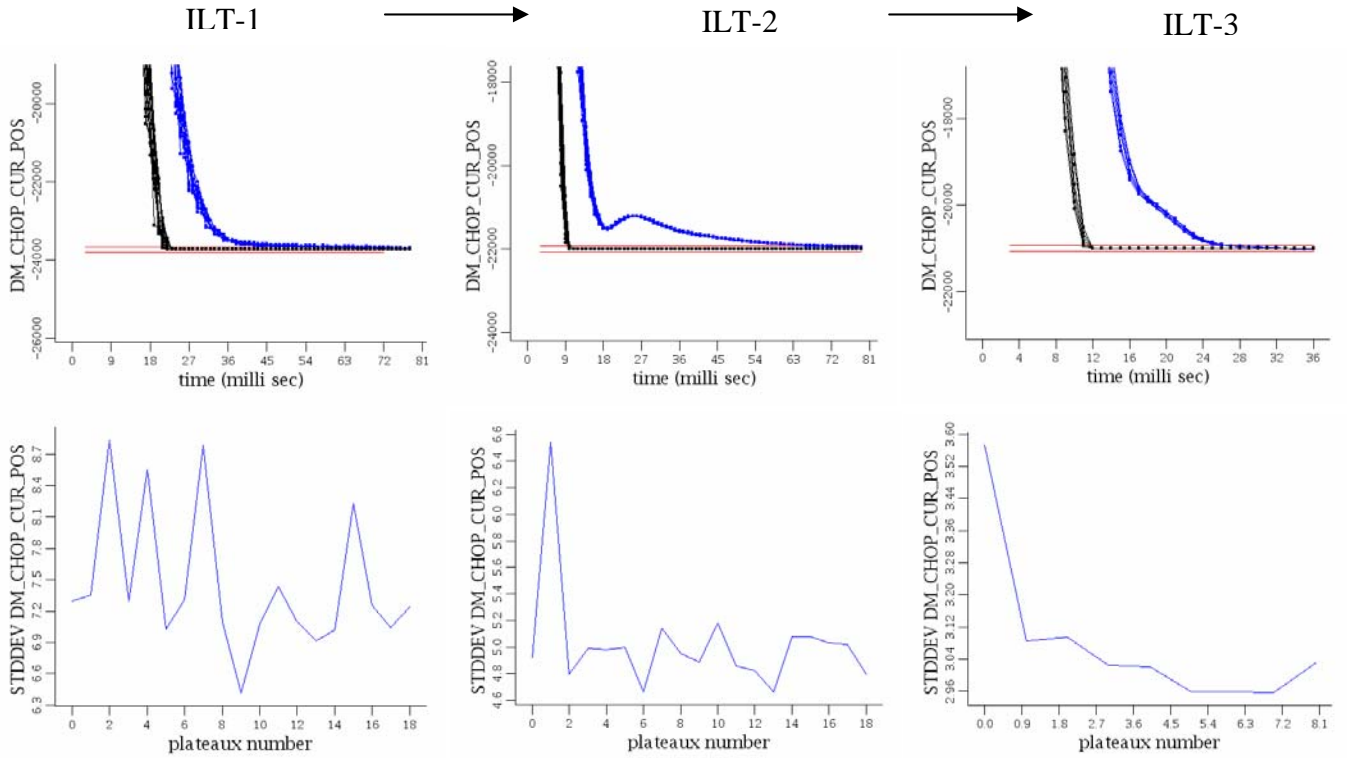


Fig. 7: Progress in chopper performance from ILT1 to ILT3. **Top:** chopper movement during the transition from the positive plateaux into the negative plateaux, for a series of chops between the calibration sources (± 8 degrees). The black curves show the chopper set-point, the blue curves the position readout and the red vertical lines the allowed plateau position accuracy range as specified. **Bottom:** standard deviation of the chopper position readout for the time when the chopper is within the specified position range of the negative chopper plateaux (note the different y-axis scales).



Fig 8: commanding PACS is mere child's play (and rejuvenating)

A new
DECMEC
User Manual ?



Verhalten bei Betriebsstörungen

- ➔ **Ruhe bewahren** und die Anweisungen unseres Personals abwarten.
- ➔ **Erlöschen der Beleuchtung** bedeutet keine Gefahr.
- ➔ **Außerhalb der Bahnhöfe ist eigenmächtiges Aussteigen lebensgefährlich!**
Nur nach Aufforderung durch das Personal aussteigen. Das Personal führt Sie zum nächsten sicheren Ausgang.
- ➔ **Bei Rauchentwicklung oder Feuer**
Notbremse ziehen und über Notruf (☎) das Personal informieren. Bei unmittelbarer Gefahr das Feuer bekämpfen. Die Plätze der Feuerlöscher sind gekennzeichnet (🔥). Der Zug hält im nächsten Bahnhof.

Procedure in the case of breakdown

- ➔ **Keep calm** and follow the instructions of our personnel.
- ➔ **Malfunction of light-system** does not mean any danger.
- ➔ **Outside stations getting off the train is highly dangerous!** Don't get off the train unless our staff instructs you to do so. A member of our staff leads you to the next safety exit.
- ➔ **In case of smoke emission or fire**
inform our personnel by emergency call (☎). At imminent danger, fight against fire. The places with fire-extinguishers are marked (🔥). The train stops at the next station.

Comportement en cas de défaillance

- ➔ **Gardez votre calme** et suivez les instructions de notre personnel.
- ➔ **La défaillance de l'éclairage** n'est pas signe de danger.
- ➔ **En cours de route toute descente sur votre propre initiative peut vous mettre en danger de mort!** Suivez les instructions de notre personnel, qui vous mènera à la prochaine gare en toute sécurité.
- ➔ **En cas de dégagements de fumée ou d'incendie en cours de route** informez notre personnel par commutateur d'urgence (☎) s.v.p.
E cas de danger imminent combattez le feu. Les lieux d'extincteurs sont marqués (🔥). Le train arrêt à la prochaine gare.

Fig. 9: we finally have a set of safety instructions for cases of malfunctions of the instrument or the operational environment. This figure shows the plate which is installed now in the opera. Any resemblance to similar plates in Munich subways is by pure chance...



Fig. 10: Pacsi is looking forward to more relaxed times.

The PACS Number of the Week: 120

the amount of FM ILT test data, in GByte, recorded in the data base.

Pictures:

Figure 8 (top): featuring Gabriel Müller

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