In case S5 the pole extension is extended from the original 80 cm by 14 cm to the left and right. Outside the pole region is more space, there the extension is 65 mm thick. The color graded plot of the absolute B-field is shown in fig. 13. For safety reasons it was decided that the former outer magnet shield should be included again. In such case, an asymmetric pole extension (5cm left of the pole and 13 cm right to the pole) was the optimum. The color graded plot of the absolute B-field of this scenario (S9) is shown in Fig. 14. The highest field is marked by a red arrow.

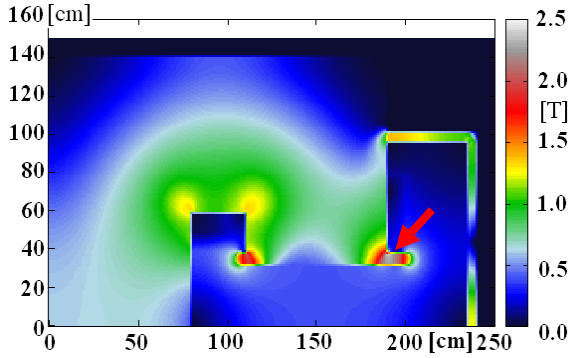

Fig. 14: Color graded absolute B-field [T] for scenario S9.

FINALIZING THE GEOMETRY

The maximum B-field in the geometry, indicated by a red arrow in Fig. 14, was regarded as too high. Additional simulations showed that if for example the pole extension plate thickness could be increased to 12 cm, then the maximum field would be less than 2 T. However there is a limit in manufacturing the iron block dimensions for increasing the yoke height. The yoke extension parts were decided as 4 pieces of 15 cm·60 cm·150 cm. This allowed a compromise for the extension piece thickness of 80 mm at the pole, and adding another 25 mm on the right side outside the pole. On the side of the pole extension facing the oven, C10 corners were cut, and on the other sharp edges, C20 corners. An enlarged view of the field between pole and core is shown in Fig. 15, and |B| is shown in Fig. 16. The magnet current is 992 A, the ratio of B_{min}/B_{max} along the core is 0.79 and the maximum value of the B-field in the extension is 2.38 T. An intermediate installation stage of the magnet is shown in Fig. 17, where the two pole extension pieces are visible.

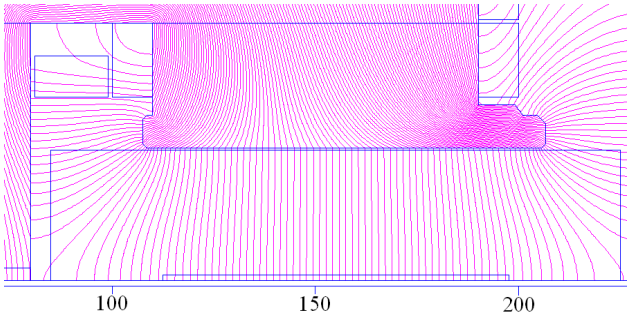

Fig. 15: B-field region between core and upper magnet pole with 80 mm thick extension. The axis unit is [cm].

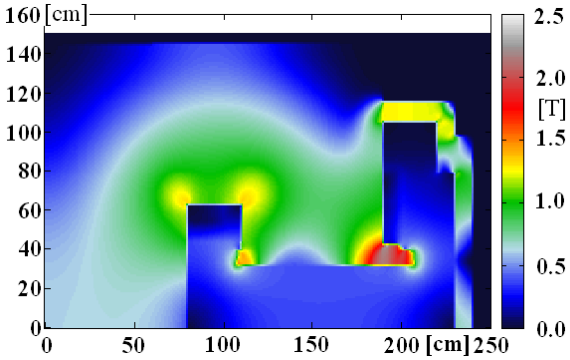

Fig. 16: Color graded absolute B-field of the production version.

Fig. 17: The Kappa magnet with pole extensions during installation in the NU1 building.

SUMMARY AND OUTLOOK

The 2D simulation results show that the required field of 0.3 T can be obtained with a magnet current in the order of 1000 A. The manufacturing process for the parts to modify the "Kappa" magnet yoke was started.

We plan that the modified magnet, currently installed in the NU1 building of J-PARC, will become available this year in summer for high impedance core annealing. Then we can run performance test with these high impedance cores, which are intended to support the J-PARC intensity upgrade in the future [4].

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