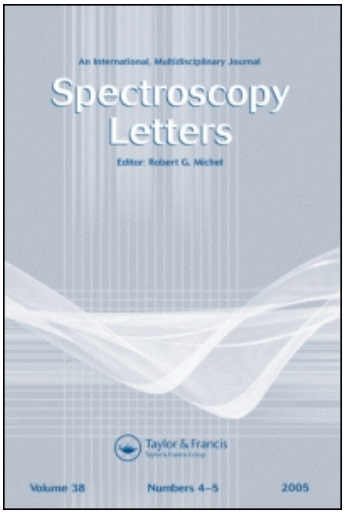

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Magnetic Shielding Problems with Commercial CD-Instruments

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Magnetic Shielding Problems with Commercial CD-Instruments

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During the past 2 years, more and more MCD equipment has been installed at different European laboratories. All of these commercial CD-Instruments have been interfaced with magnets, usually superconducting ones. Most of these systems have run into different kinds of difficulties, and none are really operating properly.

One difficulty is the shielding of sensitive spectropolarimeter parts like the PM or the light source from the intense magnetic fields (up to 50 kG at the magnet center). It seemed therefore useful to publish some of our data about this problem, also considering that such data can be useful beyond our MCD problem, the shielding of a PM, e.g., being of general interest.

We have first calculated the magnetic field produced at different spectropolarimeter sites by a split-coil superconducting magnet, assuming $\mu = 1$ everywhere. Comparing the calculated field with measurements at different sites we have seen that they are equal to each other, within acceptable error limits. We are thus able to know the field also at sites, which are hardly accessible, like the lamp center or inside the PM.

We have then calculated the shielding factors of cylindrical shells as used for the PM or the Xe-Lamp housing, and the effect of fields penetrating into the cylinders through open ends.

The penetration of fields through open cylinder ends represents the main danger to sensitive parts like the PM's. On the other side, it is very hard to obtain any results on this problem just by calculations. The basic behaviour of the field can be predicted by theory; but quantitative evaluation is possible only after some crucial parameters have been safely established by complex measurements. Results of such measurements have been published by Dr. A. Mager of Vacummschmelze Gmbh, Hanau, and we have made ample use of his results.

In conclusion this work gives suggestions for the design of the lamp-housing and PM shielding; it further gives some information of the kind of problems and the effects to expect in magnetic shielding problems with optical spectrometers.

For the detailed calculation, concrete numerical results and literature references we must refer the reader to part A of the symposium report.

+ PM = Photomultiplier