ESRF	**Experiment title:** High resolution directional Compton Profiles measurements in single crystal $Bi_2Sr_2CaCu_2O_8$	**Experiment number:** HE 393
Beamline: ID15B	**Date of Experiment:** from: 18.1.98 to: 25.1.98	**Date of Report:** 1.3.98
Shifts: 21	**Local contact(s):** A. Shukla	Received at ESRF: 0 6 MAR. 1998

Names and affiliations of applicants (*indicates experimentalists) :

*A.Shukla** ESRF

*A.A.Manuel** DPMC, University of Geneva 24 Quai E. Ansermet 1211 Geneve 4, Switzerland

B.Barbiellini Solid State Group, Physics Dept. 405 Hilgard Ave., Los Angeles CA 90095-1547

Report:

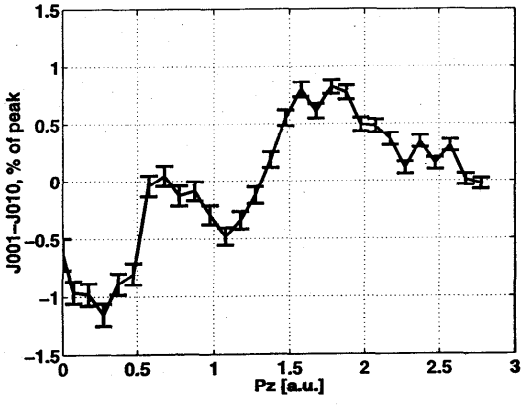
In the light of our earlier experiments in the $YBa_2Cu_3O_7$ (YBCO) system, we had proposed to study anisotropies in $Bi_2Sr_2CaCu_2O_8$(BSSCO), so as to get information on the normal state electronic structure. We also decided to measure the temperature dependance of the Compton profile along the c-axis so as to compare with a similar experiment performed with YBCO (see report on experiment HE 278). Room temperature Compton profiles were measured for the [010] and [001] directions. The [001]-[010] anisotropy is shown in figure 1. In the case of YBCO, we had used this anisotropy to make inferences about/the nature of the coupling between copper-oxygen layers that are thought to be instrumental for superconductivity. The standard local density approximation (LDA) predicts an energy splitting for 2-layer high Tc compounds, due to electron coherent motion between the layers, hence two Fermi surfaces in the x-y plane of the Brillouin zone. BSSCO is known to exhibit a more two dimensional nature than its other superconducting cousins, and photoemission results tend to indicate that the two Fermi surfaces are degenerate. Our measurement however, is not surface sensitive and results are valid for the bulk. Though we do not have a theoretical curve for comparison at this moment, a simple calculation suggests that if coherent electronic motion was possible between the Cu-O planes which are separated by 6.35 a.u., a peak would be expected at a momentum of $2\pi/d = 1$ a.u. in the anisotropy shown.

It is clear that such a feature is absent, confirming the results already obtained for YBCO. As mentioned in the report for experiment HE 278, this does not rule out coherent motion below the superconducting transition[l]. Also, a standard BCS approach would indicate that, taking into account the relatively large gap found in high-Tc superconductors, an observable effect in the momentum density can be expected below Tc ([2]). In figure 2 we show the difference between the c-axis Compton profiles measured at 100K and at 14K. No significant difference is observed.

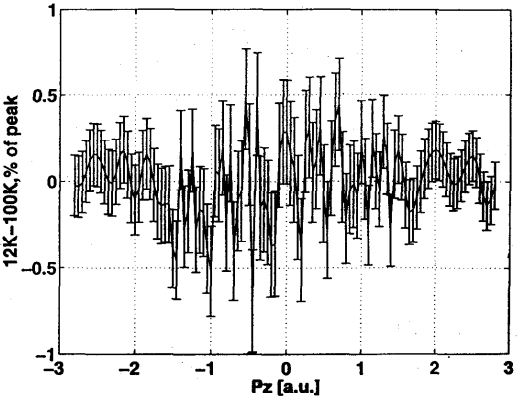
References

[l] S. Chakravarty, A. Subdø, P.W. Anderson and S. Strong, Science 261 (1993) p. 33.

[2] S.E. Barnes and M. Peter, Phys. Rev. B 40 (1989) 10958.



figure(1)



figure(2)