This task enforces collaboration between BINP and INFN in the field of drift chambers technologies. The group lead by Franco Grancagnolo suggested a next-generation drift chamber as main tracker of the SCT detector. The project featured full stereo wires geometry, very low-material budget and cluster-counting readout technique and, as a result, improved momentum and energy deposition resolution. This ambitious option for the SCT main tracker needs to be proven. The main objective of this task is to design, produce and test a fully operating prototype that, if successful, will serve as drift chamber upgrade of the CMD3 detector in BINP. Current activity is devoted to three topics:

1. Mechanical design. It includes novel mechanical tension recovery scheme that minimizes material in front of the end-plate calorimeter. The conceptual design of the whole mechanical structure of the prototype (designed to fit the tracking system of the CMD3 detector) has been completed. The Finite Element Analysis of all mechanical components is in progress. The construction of a full-scale portion of one end cap is planned, in order to verify the expected stress-strain relations.

2. Carbon wires coating technology. Continuous improvements are being introduced in the magnetron sputtering facility realized at BINP. Silver coated 40 μm aluminum wires have been successfully gold coated (up to 30 nm thickness) without affecting the wire mechanical properties. Moreover, a stable coating process with Nickel has been reached for long pieces (3 m) of carbon monofilaments. Attempts at coating procedures with Copper, in order to reduce the linear resistivity of the coated carbon wires, are being made. New materials for continuing the test campaign have been procured.

3. FPGA-based fast digitizer required for the cluster counting regime. The aim of this activity is to isolate in the digitized signal spectrum of a drift cell the relevant features related to the drift of individual ionization clusters, in real time. The advantage of this procedure is twofold: it allows for a reduction of the amount of data transfer to the recording devices and, at the same time, it provides, in conjunction with analogous proximity information, details which can be used to correlate hits to form track segments, again, in real time. After the successful tests done with a single drift channel, new and more sophisticated hardware has been acquired to treat simultaneously two channels and to prove the feasibility of correlating contiguous hits.