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New measurements of radial velocities in clusters of galaxies. III. *

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Abstract. — We have obtained 95 redshifts in eight Abell galaxy clusters using the multi-object spectrograph SILFID. Data on individual galaxies are presented, and the accuracy of the determined velocities are discussed as well as some properties of the cluster. Near complete samples of galaxies have been obtained for the clusters A957, A2063 and A2589 in their central regions.

Key words: Redshifts of galaxies — cluster of galaxies.

1. Introduction.

Redshift surveys in clusters of galaxies provide an essential tool to study the formation and evolution of large-scale structures. They allow to access the evolutive stage and dynamics of clusters and give important clue on the dark matter content of these structures.

The number of redshift determinations is very rapidly increasing since multi-object facilities have been developed associated with the generation of 3-4m telescopes. The spectrograph SILFID which is adapted to fiber optics devices has been designed to work in two configurations: either for several adjacent regions in a single extended object or for simultaneous observations of several point-like objects in a field. We present here our first redshift measurements obtained with SILFID in A194, A376, A539, A957, A2040, A2063, A2443 and A2589 using the second configuration. Section 2 presents the instrumentation. Section 3 discusses the data reduction techniques and comparisons with previous measurements. In Section 4 an analysis of A376, A957, A2063 and A2589 is performed using nearly complete samples.

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* Based on observations made at Haute-Provence Observatory, CNRS.

2. Instrumentation and observations.

The observations were carried out mainly during four observing runs between April and October 1989 at the 1m93 telescope at Observatoire de Haute-Provence. The multi-object spectrograph SILFID (Vanderriest & Lemonnier 1988) was attached at the Cassegrain focus, equipped with drilled plates. Thirty separate optical fibers were available for collecting the light from galaxies spread over a field of 20 arcminutes diameter in the telescope focal plane. Each silica fiber has its own optical coupling, by means of a spherical saphir microlens, and is fed close to its maximum numerical aperture. On the 1m93 telescope, the field of view is then about 5″ for each fiber of 200 μm diameter. In front of the collimator, the fibers are aligned to form a pseudo-slit. One originality with SILFID is that the fibers are in a compact removable "drawer" that includes aperture plate, fibers and pseudo-slit. Having 2 such "drawers", we can prepare quietly the next field while exposing the previous one. The repeatability of positioning is about 20 μm (or 0″15 on the sky).

The preparation of the drilled plates was made using Dressler (1980) coordinates, transformed into XY ones with a scale of 1 arcsec = 140 μm. Corrections for atmospheric refraction were also made considering that all observations were carried out in the vicinity of the meridian plane in order to minimize its effects which could lead to smal fibre/image offsets during the course of observations. One or two guide stars brighter than magnitude $V = 11$,

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