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SAURON: OBSERVATIONS OF E/S0/SA GALAXIES

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We present results from a new and unique integral-field spectrograph, SAURON. It has a large field of view and high throughput and is primarily built for the study of stellar & gaseous kinematics and stellar populations in galaxies. Its aim is to carry out a systematic survey of the velocity fields, velocity dispersions, and line-strength distributions of nearby ellipticals, lenticular galaxies and spiral bulges. Its wide field is especially useful for the study of complicated velocity structures. Together with other spectroscopic data, images, and dynamical modelling, SAURON will help to constrain the intrinsic shapes, M/L ratios, and stellar populations of early-type galaxies and spiral bulges.

SAURON (Spectroscopic Areal Unit for Research on Optical Nebulae) is a TIGER-like integral field spectrograph (Bacon et al. 1995) with an array of 1577 square lenses, built for the William Herschel Telescope of the Isaac Newton Group on La Palma. One of its most notable features is the large field of view of $33'' \times 41''$. The instrument is the result of a collaboration between three institutes: the Sterrewacht Leiden, the Observatoire de Lyon, and the University of Durham.

The data are reduced with especially developed software based on the existing XOASIS package. An optimal extraction algorithm is used to recover the individual spectra from the tightly packed configuration on the CCD (Bacon et al. 2001).

The intrinsic shapes and internal dynamics of ellipticals and bulges have long been the subject of debate. Many galactic components (e.g. halos and bars) and entire galaxies (e.g. giant ellipticals) are known to have triaxial shapes. Questions that require further investigation include: (a) What is the distribution of the intrinsic triaxial shapes? (b) What is, at a given shape, the range in internal velocity distributions? (c) What is the dynamical role of massive central black holes? (d) What is the relation between the stellar and gaseous kinematics and the stellar populations?

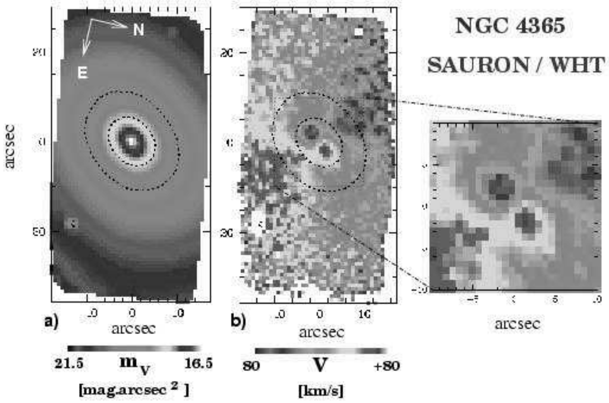

Fig. 1. SAURON maps of the E3 galaxy NGC 4365 (Davies, Kuntschner et al. 2001). a) surface brightness as reconstructed from our data, b) mean streaming velocity V. The enlarged core region of the velocity map shows clearly the kinematically decoupled core.

With this in mind, the SAURON project has the following goals: (a) To provide a full census of nearby early-type galaxies along the Hubble sequence (b) To extract complete 2D velocity fields and line strengths for the observed galaxies (c) To combine the results with state-of-the-art dynamical modelling and stellar population analysis. The SAURON survey has observed a representative sample of 72 nearby ellipticals, lenticulars, and Sa bulges constructed to be as free of biases as possible while ensuring the existence of complementary data (e.g. HST). The galaxies are further split into "cluster" and "field" objects and populate the six $\epsilon - M_B$ planes uniformly (de Zeeuw et al. 2002). By construction, the sample covers the full range of environment, flattening, rotational support, nuclear cusp slope, isophotal shape, etc. A SAURON map of NGC 4365 with its kinematically decoupled core is presented in Figure 1.

REFERENCES

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