The multi-phase ISM of radio galaxies

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1 - Centaurus A shows that the interaction between a radio jet and a gas cloud can kinematically disturb different phases of the gas and induce the formation of stars (Chapter 2, 3, 4). In the specific case of the outer filament of Centaurus A, the induced star formation is inefficient and its effect is limited to small regions (Chapter 4).

2 - The study of the compact radio galaxies PKS B1718-649 and PKS B1934-63 gives indications that, in this class of galaxies, circum-nuclear disks of H2 and ionized gas extending a few hundred pc are reservoirs of gas from which the SMBH can potentially be fed, triggering the AGN activity (Chapter 5, 6).

3 - Classical methods used in optical studies to determine the density of the warm ionized gas are not sensitive to the high-density regime and lead to overestimating the AGN feedback efficiency. By using alternative diagnostics, for PKS B1934-63 there is evidence that the outflowing warm ionized gas reaches very high densities and that the AGN feedback operates at low efficiency (Chapter 6).

4 - The compact radio galaxy PKS B1934-63 shows that an AGN is able to drive high velocity shocks with velocities up to thousands of km/s which accelerate and ionize the gas of the ISM (Chapter 6).

5 - The multi-phase properties of gaseous outflows in young radio sources give new hints on the origin of cold gas outflows. In particular, they support the scenario in which cold gas outflows consist of gas that cools down within the outflow itself rather than cold gas surviving the AGN-ISM interaction and being gradually entrained and accelerated (Chapter 6).

6 - In radio galaxies, the HI gas tends to show regular kinematics, possibly associated with disk-like configurations, while it is common to find signs of ionized gas outflows. In addition, radio galaxies with the most extreme kinematics of ionized gas appear to lack atomic gas. These results suggest that the ionized gas is more sensitive to the effects of the AGN feedback while the atomic gas might be a transitional phase which is more difficult to detect in outflows (Chapter 7).

7- Even though our Universe is a spacious place and in constant expansion, the astronomical community is still afflicted by internal wars to conquer tiny pieces of unexplored lands.

8- Being modest is a simple way to make our world a better place.

9- Considering a galaxy as an ensemble of stars, dust and gas corresponds to describing a painting as color on a canvas or a book as words on a page. (Inspired by Siri Hustvedt)

10- Astronomy is a way of challenging your definition of the terms ‘home’ and ‘family’.

11- Denying the usefulness of ‘useless’ sciences, such as astronomy and philosophy, is a sign of a narrow mind.