This poster presents the initial results of a pilot study on the nuclear activity, star formation and stellar population characteristics of galaxy pairs from the Arp & Madore (1987) catalogue. The objects have been selected mainly from AM classes (spirals with well defined arms, but showing signs of interaction, where the companion is less than half the size of the main galaxy), and II (interacting doubles where the companion is more than half the size of the main galaxy). While the observations confirm the physical association of several of these systems, and provide the first study of the stellar and gas emission properties of the individual galaxies.

The data were obtained using the GMOS-S spectrograph at the Gemini-South telescope, under the “poor weather queue” programme GS-2007A-Q-340, between October 2007 and January 2008. Instrument configuration was the 0.5arcsec slit with the R150 grating, with z × 4 pixels spectral x spatial). Two grating settings were used, centred at 870 and 880Å, in order to cover the chip gaps. This setup provided full spectral coverage from 350nm to beyond 800nm (rest wavelength), at a spectral resolution of 11Å @ 656nm – just enough to separate the [NII]+Hβ blend, while at the same time covering the whole optical spectrum for redshifts up to ~0.2. The slit was aligned to include both (or two of the) galaxies, and to improve sky subtraction, the objects were nodded along the slit. Exposure time was 1hr on source (2x900sec per grating setting).

Data reduction followed standard procedures, using the Gemini/GMOS IRAF package, with the exception that no flat field correction was applied to the spectral data presented here. This was due to the strong fringing effects present beyond 750nm, which severely degraded the quality of the data towards the red. For the large apertures extracted here (20pix ~ 5.8arcsec), this has no measurable effect in the data. The imaging data correspond to no measurable effect in the data. The imaging data were used, and the acquisition images taken just prior to the spectroscopy to ensure the objects were centre the objects in the slit. The Sloan r’ filter was used, and the acquisition images were obtained under strict photometric conditions.

The underlying stellar population was modeled using the method described by Cid Fernandes et al. (2005), where the full spectrum is synthesized using the Bruzual & Charlot (2003) models. The result is a model spectrum and several relevant parameters that characterize the stellar population mixture. The ones presented here (Table 1) are the (logarithm of the) mean stellar age, (log t/yr), and the mean stellar metallicity, (Z/Z⊙), both weighted by light.

After subtracting the stellar population model, the emission lines in the spectra were measured fitting multiple Gaussians with the proper constraints to blends such as Hβ+[NII]. In none of the objects more than one Gaussian was used to represent a single line.

Figure 1: Observed line ratio [NII]/Hα vs [OIII]/Hβ diagram for the objects in our sample. See Table 1 for the identification of objects 1-7. The circles indicate individual galaxies belonging to a given physical system.

Table 1: Identification of the individual galaxies within each AM system. Column 2 is the imaging data corresponding to the objects measured immediately prior to the spectroscopic observation (in arcsec). The redshift was measured using IRAF tasks rvinvdir and xcor, for emission and absorption spectra, respectively. Age, metallicity and reddening are derived from the spectral synthesis.

Table 2: Images of remaining observed systems. The horizontal bar indicates 30".