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DO BARS DRIVE SPIRAL DENSITY WAVES?

maybe

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We present deep near-infrared *I*
of a selected sample of near
sample covers a range of Hub
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has been predicted by theoret
at high redshift. Analysis of
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few excessively strong bars.
is relatively weak. We find t
the presence of a very strong
pattern speed, but that this m

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yes, in a statistical sense

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ABSTRACT

Recently, Buta et al. examined the question "Do Bars Drive Spiral Density Waves?", an idea supported by theoretical studies and also from a preliminary observational analysis. They estimated maximum bar strengths Q_b, maximum spiral strengths Q_s, and maximum $m = 2$ arm contrasts A_{2s} for 23 galaxies with deep Anglo-Australian Telescope (AAT) K_s-band images. These were combined with previously published Q_b and Q_s values for 147 galaxies from the Ohio State University Bright Spiral Galaxy Survey (OSUBSGS) sample and with the 12 galaxies from Block et al. Weak correlation between Q_b and Q_s was confirmed for the combined sample, whereas the AAT subset alone showed no significant correlations between Q_b and Q_s, nor between Q_b and A_{2s}. A similar negative result was obtained in Durbala et al. for 46 galaxies. Based on these studies, the answer to the above question remains uncertain. Here we use a novel approach, and show that although the correlation between the *maximum* bar and spiral parameters is weak, these parameters do correlate when compared *locally*. For the OSUBSGS sample, a statistically significant correlation is found between the local spiral amplitude, and the forcing due to the bar's potential at the same distance, out to ≈1.6 bar radii (the typical bar perturbation is then of the order of a few percent). Also for the sample of 23 AAT galaxies of Buta et al., we find a significant correlation between local parameters out to ≈1.4 bar radii. Our new results confirm that, at least in a statistical sense, bars do indeed drive spiral density waves.