RevMexAA (Serie de Conferencias), **40**, 54–55 (2011)

THE ROLE OF TIDAL DWARF GALAXIES IN GALAXY EVOLUTION

D. F. de Mello,[1] C. Mendes de Oliveira,[2] S. Torres-Flores,[3] and F. Urrutia-Viscarra[2]

RESUMEN

A continuación presentamos un resumen del trabajo que hemos llevado a cabo en orden de entender el rol de las galaxias enanas de marea (GEMs) en la evolución de galaxias. GEMs son comúnmente vistas en sistemas en interacción. Estos objetos son jóvenes, los cuales son formados a partir de los residuos (gaseosos y estelares) resultantes de la interacción entre galaxias. Hemos usado una gran variedad de instrumentos, en diferentes longitudes de onda, para detectar las GEMs, así como también regiones de formación estelar dentro de colas de marea de hidrógeno neutro y con la ayuda de modelos de poblaciones estelares hemos estimado sus edades. También hemos determinado la metalicidad de algunas GEMs y hemos concluido que estos objetos tienen una metalicidad mayor que la presentada por galaxias enanas. Finalmente, discutimos la importancia de estos objetos en el universo distante y su importancia en el enriquecimiento químico de éste.

ABSTRACT

We present a summary of the recent work that we have been conducting regarding the role of Tidal Dwarf Galaxies (TDGs) in galaxy evolution. TDGs are often seen in galaxies going through collisions. They are young objects formed from and within tidal debris. We use a variety of instruments in different wavelengths (from UV to optical) to detect the TDGs and star-forming regions within HI tails and use stellar population models to date them. We also have determined the metallicity of a few of these objects and concluded that they are metal rich with respect to the population of dwarf galaxies. We conclude by discussing the importance of these objects at high-redshfits and their significance in the cosmic metal enrichment.

Key Words: H II regions — galaxies: dwarf — galaxies: interactions

1. INTRODUCTION

When galaxies collide and merge they suffer tidal effects that will transform their properties and will also affect their gas distribution. These collisions can produce dwarf galaxies within the tidal tails (TDGs). However, the importance of TDGs in terms of galaxy evolution is still debatable. It has been shown in early galaxy simulations (Barnes & Hernquist 1992; Elmegreen et al. 1992) that only the outermost material will gain enough angular momentum and energy to become an independent dwarf galaxy. More recently, Wetzstein et al. (2007) using high resolution N-body and N-body/SPH models showed that these earlier results were affected by the low resolution of the models. They concluded that tidal dwarf galaxies are not likely to form by pure collisionless collapse in tidal tails. The high resolution models require a sufficiently massive and extended gas component in the progenitor disk in order to form bound stellar objects in the tidal arms (10^{8-9} $M_{\odot}$). Bournaud et al. (2008) high resolution models of mergers showed the formation of less massive objects (10^5 $M_{\odot}$), or super star clusters, which were interpreted as the progenitors of globular clusters. More massive objects (10^{8-9} $M_{\odot}$) also formed during collision of gas-rich galaxies and were interpreted as TDGs. However, it is not clear whether TDG production is related to the formation of dwarf galaxies, i.e., whether long-lived TDGs become dwarf galaxies. For instance, Delgado-Donate et al. (2003) survey of dwarf galaxy candidates in the vicinity of six strongly interacting galaxies concluded that field galaxy-galaxy interactions are likely to result in the formation of only a few long-lived TDGs. Thus a large sample is needed in order to verify the fraction of TDGs as a function of environment and how that correlates with the dwarf galaxy population. Members of our team have been searching for TDGs in the past few years and found a few candidates (Mendes de Oliveira et al. 2001; Torres-Flores et al. 2009). Below we describe two other studies illustrating our method to find TDGs and their properties.

2. RESULTS AND CONCLUSIONS

The first interacting system with extended HI tail we analyzed is HCG100, a compact group formed by four late-type galaxies at $v_{\rm R}$ = 5336 km s^{-1}

[1]Catholic University of America, Washington and NASA's GSFC, DC 20064, USA (demello@cua.edu).

[2]Instituto de Astronomia, Geofísica e Ciências Atmosféricas, Universidade de São Paulo, SP, Brazil.

[3]Departamento de Física, Universidad de La Serena, Chile.