Molecular interpretation of the XYZ states

R. Molina [(a)], F. Aceti [(a)], E. Oset [(a)], and T. Branz [(b)],

[(a)] Departamento de Física Teórica and IFIC, Centro Mixto Universidad de Valencia-CSIC,
Institutos de Investigación de Paterna, Aptdo. 22085, 46071 Valencia, Spain
[(b)] Institut für Theoretische Physik, Universität Tübingen,
Kepler Center for Astro and Particle Physics,
Auf der Morgenstelle 14, D–72076 Tübingen, Germany

The majority of the 'new' charmonium-like X, Y and Z mesons mainly discovered at the B-factories BELLE and BaBar cannot be easily accommodated in the $q\bar{q}$ model and are therefore interesting objects for meson structure besides the constituent quark model. They are intriguingly close to the $D^*\bar{D}^*$ and $D_s^*\bar{D}_s^*$ thresholds and there are several theoretical models which test the hypothesis of $D^*\bar{D}^*$ (or $D_s^*\bar{D}_s^*$) molecular structure. One of them is the coupled channel approach, which combined with the Hidden Gauge Lagrangians, turned out to provide a useful tool to determine the mass and width of resonances [1]. In this talk we describe some of the X, Y, Z states as dynamically generated resonances from the vector - vector interaction. All the possible channels with quantum numbers charm $= 0$, strangeness $= 0$ around the energy region of 4000 MeV are included. We find that some of the XYZ states (the Y(3940), Z(3930) and X(4160)) can fit into this structure within the model. A further interesting topic is the radiative decays of these states which are also a crucial test to hadron structure. Decay rates are also provided by the model [2] and recently we have also evaluated the decay ratio of the $X(3872)$ into $J/\psi\gamma$.

[1] R. Molina and E. Oset, *"The Y(3940), Z(3930) and the X(4160) as dynamically generated resonances from the vector-vector interaction"*. Phys. Rev. D **80**, 114013 (2009)

[2] T. Branz, R. Molina and E. Oset, *"Radiative decays of the Y(3940), Z(3930) and the X(4160) as dynamically generated resonances"*. Phys. Rev. D **83**, 114015 (2011)

E-mail: rmolina@ific.uv.es