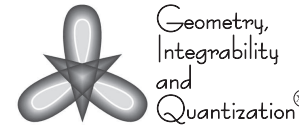
Twentieth International Conference on
Geometry, Integrability and Quantization
June 02–07, 2018, Varna, Bulgaria
Ivaïlo M. Mladenov, Vladimir Pulov
and Akira Yoshioka, Editors
Avangard Prima, Sofia 2019, pp 161–183
doi: 10.7546/giq-20-2019-161-183



CAYLEY–KLEIN POISSON HOMOGENEOUS SPACES

FRANCISCO J. HERRANZ†, ANGEL BALLESTEROS†, IVAN GUTIERREZ–SAGREDO† and MARIANO SANTANDER‡

†*Departamento de Física, Universidad de Burgos, 09001 Burgos, Spain*

‡*Departamento de Física Teórica and IMUVa, Universidad de Valladolid 47011 Valladolid, Spain*

Abstract. The nine two-dimensional Cayley–Klein geometries are firstly reviewed by following a graded contraction approach. Each geometry is considered as a set of three symmetrical homogeneous spaces (of points and two kinds of lines), in such a manner that the graded contraction parameters determine their curvature and signature. Secondly, new Poisson homogeneous spaces are constructed by making use of certain Poisson–Lie structures on the corresponding motion groups. Therefore, the quantization of these spaces provides noncommutative analogues of the Cayley–Klein geometries. The kinematical interpretation for the semi-Riemannian and pseudo-Riemannian Cayley–Klein geometries is emphasized, since they are just Newtonian and Lorentzian spacetimes of constant curvature.

MSC: 17Bxx, 22Exx, 16Txx
Keywords: Contraction, curvature, deformation, Lorentzian spacetimes, Poisson–Lie groups, quantum groups, Riemannian geometries

CONTENTS