DOUBLES AND DUALS IN POISSON GEOMETRY

Kirill Mackenzie
Sheffield

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It is well known that the double $\mathfrak{g} \oplus \mathfrak{g}^*$ of a Lie bialgebra $(\mathfrak{g}, \mathfrak{g}^*)$ can be characterized by the Manin triple conditions. A general Poisson manifold P has Lie algebroid structures on both TP and T^*P making (TP, T^*P) a Lie bialgebroid in the sense of [2], and more generally a Poisson groupoid G has associated its Lie bialgebroid (AG, A^*G), but an extension of the Manin triple theory to this case is quite complicated [1]. In this talk we describe a broad framework for understanding notions of double which provides, in particular, a justification for regarding not $TP \oplus T^*P$ but $T^*TP \cong T^*T^*P$ as the double of (TP, T^*P).

References

[1] Zhang-Ju Liu, Alan Weinstein, and Ping Xu. Manin triples for Lie bialgebroids. *J. Differential Geom.*, 45:547–574, 1997.

[2] K. C. H. Mackenzie and Ping Xu. Lie bialgebroids and Poisson groupoids. *Duke Math. J.*, 73(2):415–452, 1994.