

1125-14-1015

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Fix a rank g free group F and a connected reductive complex algebraic group G . Let $X(F,G)$ be the G -character variety of F . When the derived subgroup DG in G is simply connected we show that $X(F,G)$ is factorial (which implies it is Gorenstein), and provide examples to show that when DG is not simply connected $X(F,G)$ need not even be locally factorial. Despite the general failure of factoriality of these moduli spaces, using different methods, we show that $X(F,G)$ is always Gorenstein. (Received September 14, 2016)