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dual group of G is homeomorphic to the
character space of $L^1(G)$

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Let G be a locally compact <http://planetmath.org/AbelianGroup2abelian> <http://planetmath.org/TopologicalGroupgroup> and $L^1(G)$ its group algebra.

Let \hat{G} denote the Pontryagin dual of G and Δ the character space of $L^1(G)$, i.e. the set of multiplicative linear functionals of $L^1(G)$ endowed with the weak-* topology.

Theorem - The spaces \hat{G} and Δ are homeomorphic. The homeomorphism is given by

$$\omega \longmapsto \phi_\omega, \quad \omega \in \hat{G}$$

where $\phi_\omega \in \Delta$ is defined by

$$\phi_\omega(f) := \int_G f(s) \omega(s) d\mu(s), \quad f \in L^1(G)$$