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The Spine of Local Fell Groups

Given a locally compact group G, the *spine* of the Fourier-Stieltjes Algebra $A^*(G)$, introduced by M. Ilie and N. Spronk, is a subalgebra of $B(G)$ which contains all $A(H) \circ \eta$ where $\eta : G \to H$ is a continuous homomorphism. We say a group is *spinal* if $A^*(G)$ is all of $B(G)$. Naturally all compact groups are spinal. A known non-compact example is the Fell group $G = \mathbb{Q}_p \rtimes \mathbb{O}_p^*$, where $\mathbb{Q}_p$ and $\mathbb{O}_p$ are the p-adic numbers and integers respectively. We show that if we replace $\mathbb{Q}_p$ with a totally disconnected local field, then this group is also spinal. To date, these local Fell groups are the only known non-compact spinal groups. We also explore the higher dimensional analogue $G = \mathbb{Q}_p^2 \rtimes \mathbb{O}_p^*$, where we compute the spine explicitly. We show in this case that G is not spinal, though in some sense, it is not much larger than $A^*(G)$.