Complete caps of $H(3, q^2)$

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A complete cap of the hermitian variety $H(3, q^2)$ in $\mathsf{PG}(3, q^2)$ is a set $\mathcal{O}$ of pairwise noncollinear points such that every point of $H(3, q^2) \setminus \mathcal{O}$ is collinear with at least one point of $\mathcal{O}$. Since $H(3, q^2)$ admits ovoids, we focus on complete caps which are not ovoids. This means that $|\mathcal{O}| < q^3 + 1$. Concerning lower bounds for the size of $\mathcal{O}$, it is shown that $|\mathcal{O}| \geq q^2 + 1$, with equality if and only if q is even. We also discuss two construction methods for complete caps of $H(3, q^2)$. One of them yields locally hermitian examples of various sizes, while the other method gives rise to large examples. Finally, a summary of the spectrum of sizes of known complete caps of $H(3, q^2)$ is given.