non-bijective version of Wigner's theorem states that every (not necessarily bijective) transformation of the pure state space preserving the transition probability, i.e. the angles between rays, is induced by a linear or conjugate-linear isometry. On the other hand, Uhlhorn's version of Wigner's theorem [23] says that every bijective transformation preserving the orthogonality of rays in both directions is induced by a unitary or anti-unitary operator if $\dim H \geq 3$; the assumption of bijectivity cannot be omitted if H is infinite-dimensional. Some recent generalizations of Wigner's theorem can be found in [6, 7, 18, 22].

In [13, 15], the non-bijective version of Wigner's theorem is extended on the Grassmannian of k-dimensional subspaces of H as follows: every (not necessarily bijective) transformation preserving the principal angles between subspaces is induced by a linear or conjugate-linear isometry if $\dim H \neq 2k$; in the case when $\dim H = 2k$, such a transformation can be also the composition of the orthocomplementary map and a transformation induced by a linear conjugate-linear isometry. Also, there is an extension of Uhlhorn's version. By [10, 21], every bijective transformation of the Grassmannian preserving the orthogonality relation in both directions is induced by a unitary or anti-unitary operator if $\dim H > 2k$ (the orthogonality relation is not defined if $\dim H < 2k$, for the case when $\dim H = 2k$ the statement fails); as above, the bijectivity assumption cannot be dropped if H is infinite-dimensional. Various examples of Wigner-type theorems for Hilbert Grassmannians can be found in [8, 14, 17].

In [19], the adjacency relation on Hilbert Grassmannians of finite-dimensional subspaces is replaced by the ortho-adjacency which provides a Chow-type theorem characterizing unitary and anti-unitary operators. Closed subspaces of a Hilbert space are called *ortho-adjacent* if they are adjacent and compatible. The compatibility of subspaces is equivalent to the commutativity of the corresponding projections. Note that the ortho-adjacency relation for anisotropic subspaces of sesquilinear forms is considered in [11, 20].

Now, we assume that the Hilbert space H is infinite-dimensional and consider the Grassmannian $\mathcal{G}_\infty(H)$ formed by closed subspaces of H whose dimension and codimension both are infinite. The Grassmannian is partially ordered by the inclusion relation and every automorphism of this poset is induced by an invertible bounded linear or conjugate-linear operator [17, Theorem 3.17]. This is closely related to [21, Theorem 1.2] which states that every bijective transformation of $\mathcal{G}_\infty(H)$ preserving the orthogonality in both directions is induced by a unitary or anti-unitary operator. The orthocomplementary transformation of $\mathcal{G}_\infty(H)$ is adjacency and ortho-adjacency preserving; however, it reverses inclusions and does not preserve the orthogonality. Furthermore, there are bijective transformations of $\mathcal{G}_\infty(H)$ preserving the adjacency and ortho-adjacency in both directions and non-obtainable by unitary or anti-unitary operators and the possible composition with the orthocomplementary map. This is due to the existence of elements of $\mathcal{G}_\infty(H)$ whose intersection is of infinite codimension in each of them; such elements cannot be connected by a finite sequence, where consecutive elements are adjacent or ortho-adjacent.

In the present paper, we show that every bijective transformation of $\mathcal{G}_\infty(H)$ preserving the ortho-adjacency in both directions *locally* is induced by a unitary or anti-unitary operator with the possible composition with the orthocomplementary