1154-05-1448 **Ben Nassau*** (bcnassau@udel.edu), **Felix Lazebnik** and **Andrew J Woldar**. *On q-lifts: Finite Geometries and Algebraically Defined Graphs.* Preliminary report.

Let q be a prime power and $\mathbb{F}_q$ be the field of q elements. For $i = 2, 3$, let $P_i = L_i = \mathbb{F}_q^i$, and $f_2 \in \mathbb{F}_q[X_1, Y_1], f_3 \in \mathbb{F}_q[X_1, Y_1, X_2, Y_2]$ be polynomials over $\mathbb{F}_q$. We define $\Gamma_2 = \Gamma(q; f_2)$ to be the bipartite graph with partition sets P_2 and L_2 such that $p = (p_1, p_2) \in P_2$ and $l = [l_1, l_2] \in L_2$ are adjacent if and only if

$$p_2 + l_2 = f_2(p_1, l_1).$$

Similarly, we define $\Gamma_3 = \Gamma(q; f_2, f_3)$ to be the bipartite graph with partition sets P_3 and L_3 such that $p = (p_1, p_2, p_3) \in P_3$ and $l = [l_1, l_2, l_3] \in L_3$ are adjacent if and only if

$$\begin{aligned} p_2 + l_2 &= f_2(p_1, l_1) \\ p_3 + l_3 &= f_3(p_1, l_1, p_2, l_2). \end{aligned}$$

The canonical projection $\overline{\Phi} : \mathbb{F}_q^3 \to \mathbb{F}_q^2$, $\langle v_1, v_2, v_3 \rangle \mapsto \langle v_1, v_2 \rangle$ induces a surjective q-to-1 map $\Phi : V(\Gamma_3) \to V(\Gamma_2)$ by $(p_1, p_2, p_3) \mapsto (p_1, p_2)$ and $[l_1, l_2, l_3] \mapsto [l_1, l_2]$. This map Φ is a graph homomorphism, and so we call Γ_3 a *q-lift* of Γ_2.

We present some properties of q-lifts and explain how their specializations relate to finite geometries. (Received September 15, 2019)