$$H[X,Y] = -\int\int \pi(x,y) \log(\pi(x,y))\, dx\, dy$$

$$= -\int\int \pi(y|x)\pi(x) \log(\pi(y|x)\pi(x))\, dx\, dy$$

$$= \underbrace{-\int\int \pi(y|x)\pi(x) \log(\pi(y|x))\, dx\, dy}_{H[Y|X]} - \int\int \pi(y|x)\pi(x) \log(\pi(x))\, dx\, dy$$

$$H[Y|X] + H[X]$$