TABLE I

PERFORMANCE COMPARISON OF EVENT REPRESENTATIONS

Method	Representation	mAP@50	mAP@50:95
YOLOv5s	Event Histogram	0.822	0.690
	Time Surface	0.819	0.682
	Event Volume	**0.850**	**0.711**
YOLOv5m	Event Histogram	0.856	0.727
	Time Surface	0.848	0.715
	Event Volume	**0.861**	**0.728**
YOLOv8s	Event Histogram	**0.833**	**0.701**
	Time Surface	0.813	0.680
	Event Volume	0.831	0.699
YOLOv8m	Event Histogram	0.868	0.737
	Time Surface	0.843	0.714
	Event Volume	**0.871**	**0.743**
YOLO11s	Event Histogram	**0.863**	**0.726**
	Time Surface	0.839	0.708
	Event Volume	0.859	0.725
YOLO11m	Event Histogram	**0.873**	**0.742**
	Time Surface	0.856	0.725
	Event Volume	0.865	0.739
RT-DETR-R18	Event Histogram	**0.826**	**0.680**
	Time Surface	0.801	0.663
	Event Volume	0.809	0.659

TABLE II

DETECTION PERFORMANCE ON EVENT HISTOGRAM INPUTS

Method	mAP@50	mAP@50:95	mAPs
YOLOv5s	0.822	0.690	0.458
YOLOv5m	0.856	0.727	0.508
YOLOv8s	0.833	0.701	0.453
YOLOv8m	0.868	0.737	0.512
YOLO11s	0.863	0.726	0.490
YOLO11m	0.873	0.742	0.512
RT-DETR-R18	0.826	0.680	0.499
RT-DETR-R18 + AAL	0.833	0.694	0.516
M2Former	0.822	0.663	0.466
M2Former + AAL	0.826	0.677	0.511
M2Former + AAL + Aug	**0.903**	**0.743**	**0.580**

TABLE III
MODEL EFFICIENCY COMPARISON

Method	Params (M)	GFLOPs
YOLOv5s	9.1	23.6
YOLOv5m	20.9	63.7
YOLOv8s	11.1	28.6
YOLOv8m	25.9	78.9
YOLO11s	9.4	21.5
YOLO11m	20.1	68.0
RT-DETR-R18	20.1	58.2
M2Former	**9.7**	**27.5**

TABLE IV
ABLATION STUDY ON M2FORMER COMPONENTS

Method	mAP@50	Δ mAP@50	mAP@50:95	Δ mAP@50:95
M2Former (baseline)	0.822	-	0.663	-
w/o Res2Net	0.795	-0.027	0.644	-0.019
w/o Spatial Attention	0.809	-0.013	0.658	-0.005
w/o Channel Attention	0.805	-0.017	0.650	-0.013
w/o SPD-Conv	0.814	-0.008	0.651	-0.012

TABLE V
DETECTION PERFORMANCE ON EVENT HISTOGRAM
UNDER LOWER RESOLUTION INPUTS

Method	mAP@50	mAP@50:95	mAPs
YOLOv5s	0.719	0.556	0.414
YOLOv5m	<u>0.796</u>	<u>0.617</u>	<u>0.506</u>
YOLOv8s	0.771	0.598	0.482
YOLOv8m	0.790	0.617	0.503
YOLO11s	0.726	0.564	0.448
YOLO11m	0.728	0.572	0.423
RT-DETR-R18	0.733	0.562	0.492
RT-DETR-R18 + AAL	0.752	0.580	0.524
M2Former	0.699	0.524	0.472
M2Former + AAL	0.721	0.546	0.488
M2Former + AAL + Aug	**<u>0.809</u>**	**<u>0.622</u>**	**<u>0.546</u>**

TABLE VI
ZERO-SHOT DETECTION PERFORMANCE FROM SYNTHETIC DOMAIN TO REAL DOMAIN

Method	Modality	Light Condition	AP50	AP50:95
YOLOv8s	RGB	Normal Exposure	0.027	0.006
		Overexposure	0.004	0.001
		Underexposure	0.000	0.000
		Average	0.010	0.002
YOLOv8s	Event	Normal Exposure	0.260	0.158
		Overexposure	0.141	0.093
		Underexposure	0.275	0.143
		Average	0.225	0.131
M2Former	Event	Normal Exposure	0.538	0.261
		Overexposure	0.255	0.129
		Underexposure	0.781	0.331
		Average	0.525	0.240