Event selection criterion	lllvjj region	WZjj region	VBSSR
Event cleaning	√	√	√
GoodRunList	√	√	√
Trigger	√	√	√
Primary Vertex	√	√	√
lllvjj finale state			
≥ 2 jets	√	√	√
≥ 3 Z-Analysis leptons	√	√	√
One SFOC pair	√	√	√
l_W is in W-Analysis selection	√	√	√
Transverse momentum of leading leptons			
$p_T(l) > 25(27)GeV$	√	√	√
Transverse momentum of subleading jet			
$p_T(j_2) > 40GeV$	√	√	√
$M_T(W) > 30GeV$		√	√
$\|M(ll) - 91.1876GeV\| < 10GeV$		√	√
four Baseline leptons veto		√	√
b-jet veto		√	√
$M(jj) > 500GeV$			√
$\Delta Y(jj) > 2$			√

Table 0.1: Text [**Bittrich.27.05.2020**]

Event Selection is done in order to degrease background and get a clean signal process. VBS processes have a small cross-section around 1 fb resulting in a small event count. In the 2015 and 2016 Atlas run with 36 fb^{-1} not even 100 events produce VBS processes. There for one has to carefully select Events in order to get a meaningful signal process. The Events Selection is implemented as described in [**Bittrich.27.05.2020**] using the Common Analysis Framework(CAF). The Object selection however was already done in ELCore and account for the Event cleaning, GoodRunList, Trigger, Primary Vertex in Table 0.1 these cant be change in the CAF. Therefore, only the Event selection done in the CAF will be discussed. ELCore produces beam reconstruction level samples the Event Selection in the CAF is split into the three phase space regions lllvjj, WZjj and the VBS signal region(VBSSR). Even though the regions are different the selection criteria overlap. The WZjj region use the selection criteria of the lllvjj as base and introduces new selection criteria. The same is true for the VBSSR which builds upon the WZjj region as show in Table 0.1.

lllvjj region: Only events with 3 or more leptons that pass the Z-analysis are chosen. The Leptons are then assigned to the decaying gauge boson. For this same flavour and opposite charge(SFOC) leptons pairs are chosen. The pair with invariant mass close to the Z Boson mass is assigned to the Z-Boson. The highest transverse momentum p_T lepton from the remaining leptons is assigned to the $W^{\pm}$-Boson and required to pass de W-analysis. Chosen leptons need a transverse momentum $p_T > 25(27)$ GeV for the 2015(2016) campaign for the

events to pass the trigger threshold. Events have to have two or more events in order to be selected. These jets need to have $p_T(j) > 40$ GeV to be considered as tagging jets.

WZjj region: Additinal cuts are applied for the WZjj region in order to maximise $W^{\pm}Z$ contribution in the lllvjj final state. Some Events line ZZ diboson production are expected to produce an additional lepton therefore a four lepton Baseline veto is applied. Events where the jet is considered a b-jet are discarded to minimize $t\bar{t}$ and other t-quark contributions. The Transverse mass of the $W\pm$-Boson is required to be greater than $M_T(W) > 30$ GeV. The Z lepton pair has to have an invariant mass within 10 GeV of the Z-Boson mass $m_Z = 91.1876$.

VBSSR region: